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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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The British Association

THE nineteenth Annual Meeting of the British Association, which was opened in Hull on Wednesday and will be continued for a week, promises a wide range of interest and a high standard of discussion. Last year Dr. Forster's address to the Chemistry Section on "The Laboratory of the Living Organisation" was one of the most imaginative and suggestive of the contributions, and commanded wide attention. This year the general presidential address by Professor Sir C. S. Sherrington is rather of the same order—a fine piece of philosophical observation, reflection, and suggestion on the subject of "Animal Mechanism." As a purely intellectual and literary exercise, and as an example of how even a familiar problem may be illuminated under treatment by a great mind, it maintains the high traditions of the chair. This, indeed, with other contributions, goes some way to justify the rather bold claim by Sir William Pope that for grace and accuracy of expression one must look to-day to the science men even more than to the men of letters, just as, if one wants the purest classical style, one may find it in a great legalist like the Lord Chief Justice rather than in our teachers of the classics. Certainly this year's discussion gives little support to the view that the research habit kills imagination, and that science does not sort with literary feeling.

Professor J. C. Irvine's address to the Chemistry Section was practical rather than philosophical. As the occupant of a chair once held by Sir David Brewster, he reviewed the advances made by scientific chemistry in public and official estimation since that great leader's day. The change, as he pointed out, amounts to a revolution in public and official opinion. "The principles of science are to-day widely spread; systematic scientific teaching has found an honourable place in the schools and in the colleges; above all, there is a realisation that much of human progress is based on scientific inquiry, and at last this is fostered, and in part financed, as a definite unit of national educational policy." In this valuable work the Association may claim a great share. Coming more directly to the subject of his address, "The Organisation of Research," Professor Irvine offers advice and suggestions well worth attention. He insists that the first step must be systematic experience in pure and disinterested research, without any reference to the more complicated problems of applied science; that if technical research is to progress on sound lines the foundations must be truly laid. "I have no doubt," he confidently states, "as to the prosperity of scientific industries in this country so long as we avoid hasty and premature specialisation in those who control them." This is really the fundamental rule for all specialised or applied studies, and cannot be too strongly urged. The desire to switch boys from general courses of education on to direct trade or technical instruction at the earliest stage is responsible for the cheap reputation which much of our so-called technical education has unhappily acquired, and the same danger of turning a student into a practical technologist before he has mastered the principles of his science applies to the most advanced stages. Results built up on this immature foundation are bound to be disappointing, and the fact cannot be too widely recognised.

During the week some discussions of great interest may be expected in the Chemistry Section. On Monday Dr. E. F. Armstrong will introduce the subject of "The Hydrogenation of Fats," and will be followed by Mr. E. R. Bolton ("Technical Aspects of Hydrogenation"), Professor J. W. McBain ("The Study of Soap Solutions"), Dr. T. P. Hilditch, and others. On the following day the problem of "The Nitrogen Industry" is down for discussion, and the contributors

will include Dr. J. A. Harker ("Post-war Progress in the Fixation of Nitrogen"), Mr. J. A. West ("Raw Materials for Synthetic Ammonia: the Manufacture of Hydrogen and Nitrogen"), Mr. C. J. Goodwin ("The Häusser Process of Nitrogen Fixation"), and Dr. E. B. Maxted ("Some Aspects of the Relation between Water Power and Nitrogen Fixation"). These alone should suffice to ensure the success of the Chemistry Section meetings.

One cannot complete this notice without a word of acknowledgment of the excellent arrangements for enabling the Press to make known the work of the Association and to report its proceedings. Advance copies have been circula ed of the president's and other addresses, and the journal of the week's proceedings gives not only the sectional programmes but concise summaries of the papers. And there are no restrictions beyond the necessary rule that the matter must not be published before presentation. The Association may be congratulated on the admirable spirit in which this important department of its work is managed.

A Larger Outlook for Chemists

In the United States, as in this country, attention is being given to the question why chemists exert so comparatively small an influence as a class on public life. An American writer, in *Chemical and Metallurgical Engineering*, states the case in terms which scarcely require any adaptation to fit British conditions. "In my humble opinion," he says, "the reason the public has failed to appreciate chemistry and chemists has been due to the fact that chemists, as a class, have failed to distinguish themselves in the communities in which they live from the large group of manual workers. The reason for their tendency to become recluses and for their lack of interest in public affairs has always been a source of wonderment to me. University professors, as a rule, are not so subject to this criticism, since they are, by the very nature of their work, forced into a larger participation in community affairs, unless they are research men. As to the reasons for this condition, it has seemed to me that our university and college courses in chemistry lack what may be called directional emphasis. As a result a chemistry student who has seen the emphasis placed on laboratory work associates this in his mind as the goal of chemical training. If our colleges and universities had a short course in what may be called 'vocational guidance for chemistry students,' in which could be pointed out the opportunities for executive, administrative, or consulting work, and in which the obligation or opportunity of the chemist to his community could also be indicated, I believe the situation would improve within a generation. . . . I am connected with a company which receives a great many applications for positions each year from graduates of our universities. In practically every case the applicant asks for laboratory work and ceases to be interested when informed that the only openings available are in the operating, sales, or administrative departments. In other words, the opportunity to use his training for what may be called mental tasks does not seem to appeal as does the opportunity to use his hands in mere mechanical laboratory work. I always wonder if laboratory work as such does not have a certain 'play' appeal and possibly gratifies the instinct possessed by us all to manipulate apparatus in order to enjoy the glow of satisfaction derived from the successful outcome of the experiment."

It would be a kindness to chemical students to impress upon them that laboratory work, although the indispensable drudgery of the profession, promises but little more than a livelihood unless allied with other qualifications. Among these the imagination to see the possible industrial and commercial applications of laboratory results and the qualities of administration and initiative are among the most valuable in securing good positions. For this reason, the policy of segregating chemists to themselves as a class is one of the worst that could be followed. The really big men, whether on the academical, the commercial, or the technical side, are in sympathetic touch with outside interests, and their example points the way to the younger men with ambition. This is where, for example, a club, with a fairly catholic basis for membership, in which chemists mingle with members of allied professions and escape from official limitations, may be of infinitely more use to the young chemist—and incidentally immensely more interesting from the social side—than one confined to a rigidly technical class who use it to talk their own "shop" among themselves. The former may lead a young chemist into connections and openings where his knowledge may command a good market price; the latter merely leads him round in a circle. To return to the Messel Lecture, it is the old problem of imagination.

Coal Storage Troubles

At this period of the year the majority of those in charge of works on which coal is employed in any considerable quantity begin to cast an anxious eye at their coal heaps. In many industrial establishments the summer months are taken advantage of for the replenishment of coal stocks so that no risks may be run when winter comes with its delays and less certain deliveries. As a general rule, coal stocks are usually standing at this time of year just at about a maximum, and there are few probably who are not now experiencing, to say the least of it, the inconvenience which results from spontaneous heating. Although so many problems of the age prove comparatively tractable in the hands of the modern chemist, we do not seem to advance much nearer to a trustworthy specific for spontaneous combustion. Certainly, by the adoption of approved physical and mechanical measures both risk and subsequent trouble have been very considerably reduced, but conditions are such that we still experience fires where least they are expected.

Mr. O. P. Hood, the chief mechanical engineer at the U.S. Bureau of Mines, has just reminded us that the risk of spontaneous combustion per ton of coal is really very small, and it is extremely rare that in the smaller operations involving only a few tons there is any heating. The main interest lies, therefore, in the large piles needed as reserves for public utility and such undertakings. Everyone is calling for a set of directions which are perfectly simple and yet will

ensure against danger; but unfortunately the problem is too complicated for a simple solution, for the reason that many of the factors involved are difficult to determine, as there are no practical means for quantitative measurement. These factors involve a knowledge of chemistry, physics, and engineering; and, as so frequently those who are in contact with the problem are not the best of observers in these several directions, many incorrect theories, opinions, and prejudices have arisen.

Mr. Hood tells us that the trouble undoubtedly originates in the fine particles of coal because of the large surface area which this coal exposes. If, in fact, fine coal is kept out of the pile the surface is relatively so small that the cause of spontaneous combustion is removed. Trouble rarely occurs after the coal surface has been exposed for three months or more, a fact which must call into question the wisdom of a policy which is very much in evidence in this country, namely, the crushing of coal just prior to its discharge into the storage bins. There are many more factors which, though they may appear of minor importance, undoubtedly combine together in hastening on the trouble. Undue attention has, for instance, often been given to such points as the sulphur or volatile content of the coal, height of pile, etc., while more important factors such as breakage in handling, freshness of the coal, and screening before storage have been overlooked or minimised. There can be no question that in this country there is a regrettable lack of co-ordination between those works engineers who are in a position to obtain first-hand information in connection with coal-heap troubles. The result is that each individual has his own particular method of treatment, and we never appear, accordingly, to arrive much nearer a positive remedy.

The Basic Slag Shortage

ONE of the most remarkable features of recent years is the manner in which farmers and agriculturists have learnt to appreciate the value of employing artificial fertilisers. The exceptional home demand for sulphate of ammonia was, for instance, emphasised in the last report of the Sulphate of Ammonia Federation, and it is now to be gathered from the second interim report of the Committee on Basic Slag that the supplies of this important fertilizer can in no way keep pace with the demand from consumers in this country. Basic slag may certainly from the agricultural point of view be described as an important product of the iron and steel industry: but to the actual steel maker it can scarcely now be considered to possess any great attractions from the commercial standpoint. This latter fact will be understood when it is borne in mind that on the average rather less than 4 cwt. of slag is obtained from each ton of basic steel produced—a quantity which results in a revenue of only some 2s. to the steelmaker. Again, so far as output is concerned, one must not overlook that the tendency in recent years has been to substitute the open-hearth process for the older Bessemer method, and one can scarcely expect that the steelworks will sacrifice obvious advantages in the production of their main product merely to satisfy a demand for a purely subsidiary product. The open-hearth process differs from its older rival in that in the latter the phosphorus remains in the molten metal until nearly the whole of the carbon has been removed, while in the newer process the greater part of the phosphorus is removed in the earlier stages of working. A considerable amount of basic slag is certainly produced in the open-hearth process, but this is of a much lower grade so far as phosphorus content is concerned, and of low citric acid solubility. The report just published makes it clear, however, that the high soluble open-hearth slags have the same agricultural value per unit of phosphoric acid as have the old Bessemer slags; and although the low soluble slags have a smaller value, in some circumstances the difference is not markedly great. In fact, as a result of the experience gained by field trials, it is hoped that the 100,000 tons or so of low grade slag which is produced each year may possibly be turned to useful account by admixing it with mineral phosphates. The situation will be well understood when it is remembered that the demand for basic slag by farmers in this country has nearly doubled within the past ten years. So far as making good the deficiency from home supplies is concerned the prospects would seem to border on the hopeless, and, as Continental sources must not altogether be relied on, the only way out of the *impasse* would seem to be the production of a suitable mixed fertiliser.

Points from Our News Pages

Mr. A. R. Tankard contributes the second of his articles on "Chemistry in the service of the community" (p. 340).

A well-known chemical writer reviews the first two volumes of Dr. Mellor's "Inorganic Chemistry" (p. 342).

A new use for rubber was described in a paper read before the Institution of Rubber Industry by Mr. F. Kaye (p. 343).

Letters are contributed by Messrs. Charles Cooper, H. J. Bush, R. B. Pilcher, and E. Kilburn Scott (p. 344).

Reports are published of the addresses delivered at the British Association at Hull by the president (Professor Sir C. S. Sherrington) and Professor Irvine, president of the Chemistry Section (p. 346).

According to our London Report, there is little alteration in chemical markets this week, but export trade is slightly better, with an improved demand in the Far East (p. 357).

Our Scottish Market Report states that prices have shown very little change during the week. Considerable difficulty has been experienced in getting prompt shipment from the Continent (p. 359).

Book Received

PATENTS FOR INVENTIONS.—By J. Ewart Walker and R. Bruce Foster. London: Sir Isaac Pitman and Sons, Ltd. Pp. 377. 21s.

The Calendar

Sept. 6-13	British Association for the Advancement of Science: Annual Meeting.	City Hall, Hull.
18	Institution of Rubber Industry: "Reclaimed Rubber." Dr. J. Torrey.	Midland Hotel, Manchester.
19-22	Institute of Metals: Autumn Meeting.	Swansea.
Oct. 9-15	International Congress on Liquid Fuels.	Paris.

Chemistry in the Service of the Community—II.

By Arnold Rowsby Tankard, F.I.C.

(*Public Analyst and Bacteriologist to the City of Hull*)

In this article, the second of the series, the author deals with many more examples of the essential service rendered by chemistry to the community, covering such matters as vitamins as food factors, the chemical preservation of foods, the purification of water supplies, the detection of poison crimes, and the indebtedness of many industries to catalytic processes.

The Accessory Food Factors, or Vitamins

PERHAPS the most important contribution to our scientific knowledge of foods—and certainly the most startling—is the comparatively recent discovery that our natural foodstuffs contain small quantities of hitherto unrecognised bodies which have a profound influence upon growth and health. These are the accessory food-factors, which have been termed "vitamins." There are probably at least three distinct vitamins, each of which exercises a definite and separate function in the life of the animal and of man. Apparently only minute amounts of vitamins are present in the foods containing them, and their importance is out of all proportion to the quantities necessary for our health and well-being. Thus it would appear that their functions are of a nature quite different from those of proteins, or of food nutrients which supply energy to the body. It is not yet known, however, whether the vitamins present to the organism essential tissue elements in the structural sense, or whether they are of the nature of stimulants. Of their chemical nature, moreover, we are still largely ignorant.*

Vitamins are widely distributed in naturally occurring foodstuffs of the vegetable kingdom, and we have evidence that they are formed only in the tissues of plants, whence they pass into the tissues of herbivorous animals, and thus become available for carnivora. In normal times the variety of foods consumed by most European at least protects them from any great risk of deficiency. The diseases of scurvy, rickets, and of one form of beri-beri are now believed to be deficiency-diseases, due to the lack of one or other of these new food factors, though as regards rickets some authorities are of opinion that other factors are also contributory to the effects produced.

The importance of a correct diet, therefore, is now obvious. When, in our past ignorance, we have demanded the whitest flour, and the most highly polished rice, and have consumed over-cooked and water-soaked vegetables, instead of lightly steamed green vegetables or fresh green food in the form of salads, we have been depriving ourselves of those active principles in our natural foods which are of great moment to our health. Of late years, largely following American practice, many people have been consuming to an ever increasing extent canned foods of all kinds, prepared and cooked cereals and so-called breakfast foods; and most of these, with the exception of canned fruits, are deficient in one or other of the vitamins originally present. All these foods are good in their way, so long as they do not form a preponderating proportion of our diet.

Food manufacturers should now learn that our foods must be supplied in as natural a condition as possible, and we ought not to countenance unwarranted interference with them. Stale, sterilised, cooked, bottled, canned, preserved, frozen, chilled, polished, coloured and adulterated, our foods have in numerous instances lost almost all real physiological resemblance to what true foods should be.

The Sophistication of Foods

And this leads the writer to say that the adulteration, illicit preservation and alteration of our foods are only avoidable by making use of the scientific knowledge of the chemist. Adulteration of foods still goes on, though, owing to efficient control in most areas in this country, it is kept in check. To-day the definitely deleterious adulterant, dangerous to the health of the consumer, is not, with the exception of one class of substances, much in evidence. There is every reason for saying, however, that if it were not for the Sale of Foods and Drugs Acts, faulty as these Acts are, adulteration as in former days would still be rife in many foods. The temptation to enrich oneself at the expense of the public is not entirely eradicated, as we know from recent experience. But it is only right to add that the great majority of reputable food manufacturers and vendors supply a pure and good quality of food-product.

Milk is an article of food so easily tampered with, it is not surprising that it supplies most of the cases of adulteration in normal years. Adulteration of milk usually consists in adding water, in depriving it in part or all of its cream, or in adding machine-skimmed milk, in treating it with chemical preservatives or colouring matter, or in vending it in a dirty condition. Twelve years ago about 11 per cent. of all milk samples examined officially in the City of Hull were found to be adulterated. With the exception of the first complete war-year, milk adulteration in Hull has, with slight variations, shown a downward tendency, the percentage figures for the last three years being 3·6, 5·5 and 3·9 of adulterated samples. Thus the position with regard to this aspect of the milk question has been much improved; indeed, the composition of Hull milk is, on the average, highly satisfactory, showing 3·81 per cent. of milk-fat and 8·90 per cent. of other solids, as against the minimum legal standards of 3·0 and 8·5 per cent. respectively.

Another important aspect of the milk question also gives cause for satisfaction. Ten years ago about 20 per cent. of the milk samples examined in Hull contained an appreciable quantity of dirty sediment. Now the "dirt" in milk is mainly that which gets in at the farm, and in consequence it consists largely of cow dung, dust from the byres, and other foreign matters of all kinds from the hands and clothes of the milkers. Steps were taken by the local health authority to inform fully all concerned with the distribution of milk of this serious state of affairs, and from that time the position has so improved that for the last six years the amount of appreciably dirty milk discovered has not exceeded 1 per cent. in the city of Hull. Further, few cases of chemically preserved milk now come under notice. These facts show that, with regard to an article which is the main diet of many of our children, very real improvement has been effected during recent years, and a direct menace to health largely removed, at least in one area.

As showing what can be done by experts in the adulteration of milk, the following samples may be cited: Six years ago the writer examined a milk which was a mixture of 79 parts of milk of poor quality, 10 parts of milk without cream, and 11 parts of water. It also contained a dangerous preservative—formic aldehyde—to an appreciable extent, and a yellow colouring matter to give the mixture a rich appearance. In another case, milk was sold five years ago containing 11 grains of boric acid preservative in each pint; and a young child fed on this product would consume daily more than the maximum medicinal dose of a drug which could not fail to have deleterious effects.

* See Report on Present State of our Knowledge concerning Vitamins (1919). No. 38. H.M. Stationery Office.

One of the worst features of the milk adulteration question is the lack of adequate powers of the local authority. Although a milk vendor may habitually, over a period of years, be detected in the practice of adulteration, a health authority has no power to stop his selling milk in its area.*

The Prevalent Use of Chemically-Preserved Foods

The greatest danger in adulteration to-day is, perhaps, the far too prevalent use of chemical preservatives in foods. Our butter, margarine, bacon, ham, milk, cream, cheese, sausages, meats, jams, aërated waters, fruit juices and cordials, jellies, ice cream, and other foodstuffs are frequently mixed with such chemical preservatives as boric acid and borax, formic aldehyde, salicylic, benzoic and sulphurous acids and their salts, sodium fluoride, etc.; and there is no legal limit for any of these substances except in the cases of milk and cream. Whatever one's personal opinion may be as to the action of these preservatives—and the writer considers them in many cases dangerous to health when habitually ingested—the public, as consumer, surely has a right to a choice between fresh and preserved foods. As it is difficult to obtain from Parliament any adequate legislation on this subject, food chemists have for some years demanded, though with little success, the compulsory labelling of all preserved foods, showing the kind and maximum amount of preservative present. By this means the consumer would be able to exercise a choice between preserved and unpreserved food, and would be protected. Unfortunately, most food vendors are antagonistic to such a course, and it cannot be doubted that on these matters the public is apathetic, and is largely responsible for the present unsatisfactory position.

The general statistics of food adulteration in the City of Hull show an almost unbroken decline since 1910, when 9 per cent. of all articles of food examined were found to be unsatisfactory. The last three years show that 4·2, 6·9 and 5·7 per cent. were adulterated—figures which represent a considerable improvement. But in many respects the general position is far from creditable to this great country of ours, owing to our inadequate food-laws. The unnatural and objectionable treatment of, and additions to, wheat flour; the facing of rice with insoluble silicates to give it a polished appearance; the colouring of foodstuffs to give a false impression of freshness and quality; and the substitution of inferior substances in foods for preferable but more expensive ingredients—all these practices are much to be deprecated. It is largely owing to these tendencies that the cases of arsenical poisoning in connection with certain foods and constituents of foods have arisen from time to time. In spite of these failures fully to protect the consumer, however, it is to the science of analytical chemistry that the community is indebted for whatever success has been achieved.

The Purity of Water Supplies

The valuable work of the chemist in the oversight he maintains in connection with the purity of the water supplies of the country is too well known to need more than a passing mention. In many areas there is need of careful systematic analysis, and continuous chemical and other treatment, especially in water supplies from rivers and from open upland gathering grounds in the neighbourhood of dwellings and much cultivated land. Many waters, free from any such risks of pollution, are nevertheless dangerous because of their softness and acid character, qualities which tend to cause waters to act corrosively on lead pipes, and so give rise to lead-poisoning. Here the chemist can not only foretell danger, but can advise on the treatment of such waters, so that all possibility of solvent action on lead is removed. The work done by the chemists of various water boards, rivers boards, and other bodies is of great importance in conserving the health of the community. The chemist to the Metropolitan Water Board has shown that water impounded in reservoirs from possibly polluted rivers can be purified and rendered reasonably safe for drinking purposes by a system of storage for 28 days; or by the addition of an excess of caustic lime to the amount of one part of lime per 5,000 parts of water, or one tenth of this amount for soft waters, which methods of treatment either successfully sterilise the water, or at least cause the death of all disease-producing micro-organisms. In this way the water supplied to London is rendered safe.

One of the most difficult problems with which civilisation has been faced for many years is that of sewage disposal. Not many large cities are favourably situated in close proximity to a large tidal river, into which the sewage, untreated save for screening, may be allowed to pass away out to the sea. Primarily, the question of sewage treatment is a chemical and bacteriological one, and then an engineering matter. Valuable progress in this work has been registered during the last decade, and to-day all the best methods of disposal involve the harnessing of the bacterial flora of the sewage itself to do the work of purification, and by this means the putrescible components of the sewage are broken down and oxidised, and the whole transformed into inoffensive effluents which may safely be turned into open watercourses. Thus our health is preserved by scientific methods for the disposal of what in its raw state would constitute a very real danger.

Chemistry and Crime

It is a far cry from foods and water to crime; but the juxtaposition shows how far reaching chemical science is in the benefits it confers on the community. In many criminal cases the chemist is a valuable helper in the cause of justice. It cannot have escaped observation that there has of late seemed to be an increasing use of poison when undesired persons were to be removed by the criminally disposed. In all such cases the most important witness is the chemist, who has usually made an analysis of the contents of various bottles of medicines, and a searching examination of the internal organs of the body of the deceased person for possible poisons. This work is a fascinating and highly responsible task, and requires great care to remove all conceivable sources of error. In the case of alleged arsenical poisoning, for example, the chemist must satisfy himself that everything he uses in his examination—his chemicals and his glass and other vessels—are free from any appreciable quantities of the poison sought. This is no easy matter, for almost everything he handles, unless specially treated and purified, contains arsenic, sometimes in such amounts as wholly to vitiate his results and conclusions. The delicate nature of the tests used in the detection and determination of the amount of arsenic in any substance will be realised when it is stated that it is easily possible to detect one part of arsenic in four million parts of the article under examination, or one grain of poison in five hundredweights of material.

Chemistry in the Industries

It is a truism to say that many vitally important industries in this and other countries are largely dependent on the science of chemistry and on its progress by research work. To this class belong the mineral and metallurgical industries, which include, for example, gold-winning and silver extraction, and the vast iron and steel industries; the heavy chemical and alkali industries, explosives, cellulose, and artificial silk; cement, glass, the photographic industry; with many more. It is, however, with

* Since this paragraph was written, the Milk and Dairies Amendment Act, 1922, has passed into law. This Act empowers local authorities to decline to register milk dealers against whom there may, in the interests of the public health, be reasonable objections, and it will be interesting to note whether this new power becomes an effective weapon against adulteration.

broad general principles and examples of chemical progress rather than with any detailed survey of a particular industry that these articles deal.

To this end it is fitting to allude to the modern trend of chemical operations in industry, whereby the desired reactions are to-day in numerous instances brought about with the minimum expenditure of time, and of energy in terms of coal consumption. These desirable results are due to the application of what has been termed "catalysis," whereby in presence of certain substances—known as "catalysts"—the chemical action desired is markedly influenced in its rate, usually in the direction of acceleration. These catalysts may be present in very small amounts, and do not necessarily undergo any recognisable change. Moisture is a catalyst, and facilitates the combination of gases. Many metallic substances, particularly if in a finely-divided condition, or otherwise presenting a large surface, are very active catalysts.

The future of many branches of the chemical industry seems, therefore, to be bound up in the discoveries connected with catalysis. Formerly it was common to employ, in order to bring about many chemical reactions, great pressures and very high temperatures, often in the presence of strong acids or alkalis; and such operations involved the extravagant use of enormous supplies of energy obtained directly or indirectly from coal. The future is with less violent and more economical measures. Most chemical reactions normally proceed at a quicker rate with a raised temperature, and, therefore, with catalytic methods as an ally, the reactions will be again speeded up and the cost of production materially lessened.

By means of modern applications of this principle, the production of odourless and colourless hard fats, of considerable monetary value, from liquid oils of limited usefulness and low price, has been accomplished. Although stearic acid only differs from oleic acid in having two more atoms of hydrogen in its molecule, the problem of converting one into the other remained unsolved till it was shown that finely divided nickel, for example, acted as an "activator" when it was sought to reduce oleic acid to stearic acid in presence of a current of hydrogen. This now important branch of industry will undoubtedly exercise great influence in promoting the development of countries where oil-bearing seeds and nuts can be produced. The hardened oils are much used in the candle and soap industries, and even in making edible products.

The large requirements of cheap and almost pure hydrogen gas for this new industry, and its extended use for filling dirigible airships, caused chemists to reconsider the methods of preparing the gas—the older processes, involving the action of acids on metals, being costly and out of the question. To-day much of the hydrogen used for such purposes is obtained by the action of steam on iron, or other hot metal. The oxide of iron produced is really reduced to metallic iron again, and the process is, therefore, cheap and practically continuous.

Surface Combustion

It must not be supposed, however, that catalysts are a small class of substances possessing unique properties, for it has been observed that all solids when raised to incandescence have this property to about the same degree. Thus Bone showed that metallic surfaces, and those of refractory materials like fireclay, exhibit similar characters when heated sufficiently, and this phenomenon was named by him "surface combustion." In this way the efficiency of heating by means of burning gases, either coal-gas or cheaper suitable gaseous mixtures, has been very considerably increased, and the radiant heat so produced from these incandescent surfaces is in commercial use at the present time, especially in the Bone-Court boiler system. In ordinary boiler practice the heating efficiency rarely exceeds 70 per cent. of the theoretical, but in the "Bonecourt" system a heating efficiency of well over 90 per cent. has been obtained.

A Comprehensive Treatise on Inorganic and Theoretical Chemistry. Volumes I and II. By J. W. Mellor, D.Sc. London: Longmans, Green & Co. Pp. 1065 and 894. £3 3s.

In conscientious circles it is considered good practice to read a work before the preparation of its review. To follow this practice is no easy task in the case of the first two volumes of Mellor's "Inorganic Chemistry," although the reviewer is eventually amply repaid for his trouble.

The aim of the author is a most extensive and ambitious one, yet if the remainder of the work is of the order of excellence displayed in the first two volumes he will have faithfully carried out his contract as set out in the preface.

The first volume is mainly introductory. Fundamental principles are traced by the historical method, and to-day's interpretation of the laws and phenomena of chemical science is reached by stages of development treated in logical sequence. In developing this treatise upon fundamental principles the elements hydrogen and oxygen, together with ozone and hydrogen peroxide, are treated in a comprehensive way. These appear to be introduced mainly for the purpose of amplifying the chemico-physical principles involved. The chapters on solutions, crystallography, thermodynamics, the kinetic theory, and electrolysis are each memoirs and will displace certain of the special treatises already on our shelves. The whole volume is very readable, although the magnifying lens is required in the cases of certain diagrams and notes.

The first impression created is the inordinate amount of work which has been undertaken by one man in the production of these volumes. It is not a book, it is a building, and this well describes the production, which is evidently based upon a thorough filing system. Mellor has accumulated his data in a methodical way, and by this work is giving a soul to his inanimate files. The first volume constitutes the foundation and basement of the building, and in subsequent volumes reference back is to be frequently made. The books as a whole are to form a work of reference, and in this respect a good deal will depend upon the adequacy of the final index.

It is to be regretted that Professor H. E. Armstrong spoke disparagingly of the work in his Messel Memorial Lecture. Mellor's style is insufficiently Rabelaisian for the learned professor. Each chapter and section of the book receives in the characteristic way the usual Mellorian quotation from the classics—eminently chosen, apt yet quiet. He has not, however, chosen a quotation containing a certain Macbethian epithet for the introduction to the chapter on the Ionic Hypothesis, and it is perhaps on this account that his style has failed to please in all quarters.

If there be a weakness in the book it lies in the treatment of applied chemistry. Sufficient of a process, however, is usually described to allow an adequate consideration of the chemical aspect of the subject. The book will be very valuable to technical and manufacturing chemists who are wishing to analyse the chemical and physico-chemical principles of known processes rather than to ascertain recognised methods of applying these principles to the large scale.

However satisfactory may be a dictionary or encyclopædia of chemistry, it cannot possess that sequential flow which is the charm of Mellor's work. Once the student or consultant or manufacturer has adapted himself to the use of this work it will be the corner stone of his library of British works on inorganic chemistry.

The treatise as it at present appears is of the first excellence. Mellor has deserved the congratulations of his fellow chemists to whom he dedicates his work. X.

A New Use for Rubber

Employment of Latex in Paper Making

In a paper on "Rubber Latex in Paper Making," read on Monday, before the Institution of Rubber Industry, at the Engineers' Club, Coventry Street, London, Mr. Frederick Kaye, A.R.C.Sc., after briefly describing the development of paper and of rubber, went on to describe the application of rubber latex to paper making. Rubber latex, he said, contained rubber in such a unique condition that the possibilities offered for its use in the development of paper making and in other industries were very great. Latex was a wonderful natural solution of rubber with 30 to 35 per cent. of actual rubber content, and yet was a perfectly limpid liquid miscible with water in all proportions. By using rubber in the latex form, it was quite easy to get the rubber perfectly associated with paper making fibre, without the expenditure of mechanical or thermal energy upon the ultimate rubber particles.

The only cost in the use of latex in paper making, continued Mr. Kaye, was for its dilution, and filtration if necessary, when it was added to the beaten fibre in the beater. The ease with which it could be treated went far to compensate for the increased freight charges on latex as compared with coagulated rubber.

Preservation of the Latex

Dealing with experiments which had been made with a view to discovering the best method of preserving the latex, the lecturer said he had found that ammonia-preserved latex was best for paper-making because there was less agglutination of the particles by this method; he had brought home from abroad several varieties of latices preserved with ammonia without the addition of water. Recent consignments of latex had arrived with various proportions of water.

Mr. Kaye then referred to a table which he had compiled from an examination of seven samples, from which it seemed as if 3 to 3½ gallons of commercial ammonia per 100 gallons of original good latex would be a safe amount for the complete preservation of the latex.

With regard to the cost of the latex, the lecturer said that owing to a shortage of ammonia in Malaya the cost of the ammonia contained in one shipment was ridiculously high, but taking the price of ammonia delivered at United Kingdom docks, with all freightage, etc., he was informed that ammonia should cost less than 5s. a gallon on the plantations. He thought, therefore, that the cost of the ammonia used as a preservative, would be 1½d. to 2d. per gallon of latex exported. He hoped that latex would be delivered in London at 3s. 6d. to 4s. 6d. per gallon with a rubber content of 30 per cent.

The use of rubber latex in paper making, continued Mr. Kaye, was a comparatively simple process, but there was room for much experimentation in individual mills as to when and how to add the latex in the beating engine, and as to the quantity needed to produce the kind and quality of paper to be made. The great essential was the thorough dilution of the latex with water before adding it to the beater. He had usually found it best to add the latex towards the end of the beating process. The coagulation of the rubber was often a comparatively simple matter. In some cases, as with a sulphite pulp, and when small proportions of latex were needed, the fibre took up the coagulated rubber without the addition of a coagulative agent. In many experiments he had used such salts as magnesium sulphate as the coagulative agent, and in others such acids as acetic acid. He had found that in most cases it was best to use alum exactly as in ordinary paper-making processes. It was important that with an alkaline pulp the final condition should be made faintly acid to prevent loss of rubber latex in the back water.

Effect on the Paper

Some interesting problems for study and explanation were opened up by the use of rubber latex in paper making. It had, said Mr. Kaye, some specific effect upon the fibres in the beating engine, and upon the rate of hydration of the fibres. It was in this direction that the value of rubber latex as a cheapening factor in paper production would be fully seen when large supplies of latex reached the paper-making countries, so that all phases of the effect of rubber latex could be explored in the mills on a wide and continuous scale. There was every evidence that rubber latex, even in small quantities, affected the rate of hydration, and the texture and strength of the paper were improved.

Commercial Applications

Dealing with the varied applications of the process, Mr. Kaye said that while the use of rubber latex would greatly benefit the ordinary paper production, it would also open out the manufacture of new kinds of goods. It would be possible to make goods to take the place of leather, and to produce boards of such a high bursting strain and capable of such a delightful finish that they might take the place of boards in the construction of furniture, etc., and even in the construction of motor cars; linoleum substitutes could readily be made on a board machine. All the stock paper, boards, leather substitutes, and linoleum substitutes could be dyed in the process of manufacture in the beating engine, while the rubber in the latex form took up the dye as freely as the fibre, so that a great variety of effects could be produced. Mr. Kaye said he had successfully conducted a number of experiments on the dyeing of latex paper, and the British Dyestuffs Corporation, Ltd., who were keenly interested in the subject, had kindly undertaken a thorough investigation of the dyeing of rubber latex paper and of rubber latex products containing up to as much as 30 per cent. and more of rubber. Major V. Lefebure, Mr. Horsfall and Dr. Rankin, of the Dyestuffs Corporation, had given a great deal of assistance in connection with these experiments, and the lecturer handed round some samples of their first experiments on paper containing 1 per cent., 10 per cent., and 30 per cent. of actual rubber to the total weight of the products.

Discussion

The Chairman (Mr. Arthur Baker) thought that Mr. Kaye had devised a very simple process, but the acid test from the paper maker's point of view would be whether he could recoup himself on the matter of cost. The question of durability was important, especially in paper for export, and here the process might prove useful. It would be interesting to know whether the solution could be kept for any length of time.

Mr. Parker Smith said he could see great possibilities in the Kaye process at the prices mentioned, and even if the cost were higher the proposition would appeal to wrapping paper manufacturers.

Mr. Oswald Latham suggested that boards might be made by this process to take the place of ordinary packing cases.

Dr. P. Schidrowitz thought that, although the addition of small percentages of latex had a specific effect on the paper, the addition of larger proportions would probably invest it with other desirable properties.

Dr. H. P. Stevens said it seemed extraordinary that such a small proportion of latex as Mr. Kaye had used should increase the absorptive capacity of the fibre. One point which had not been mentioned was that the ammonia in the latex had to be neutralised in the sizing process by the use of alum.

Mr. Donovan expressed the opinion that the latex process was capable of wide application. He thought that paper barrels, boxes, etc., would supplant other containers. He had had experience with paper barrels containing pyrites which were not appreciably damaged after a long voyage.

Messrs. Lockhart, Clark, A. Haig, Fordyce Jones, H. Standring, J. Fairburn, Nash, B. D. Porritt, P. J. Burgess, D. F. L. Zorn, and Sir William Mills also joined in the discussion.

Mr. Kaye's Reply

Mr. Kaye, replying to the points raised, said that he hoped it would be possible to utilise latex in the manufacture of newsprint as well as in other papers. The latex was imported in the 30 per cent. state and was diluted in the paper mills. If diluted and placed in tanks in mills, he thought it would keep for several days. The rubber used in the process was new and was not vulcanised, so that the trouble caused to paper makers by the presence of old rubber in rags would not arise. The paper could no doubt be made more waterproof by the addition of a larger proportion of rubber. In this connection some latex paper bags made in this country had held water for about eight weeks. By this process the fibres were waterproofed so that crumpling of the paper would not destroy its waterproof qualities. Latex certainly improved the finish of all grades of papers, and the surface was better for writing on. A certain amount of repulping had been done with the latex paper and no difficulties had so far been encountered. He hoped at a later date to give the effect of different quantities of latex on hydration.

"The Relative Merits of Nitre Pot and Ammonia Converter"

To the Editor of THE CHEMICAL AGE.

SIR,—There are one or two points requiring notice in the further communication from "Questor" in your last issue.

First of all, let me remark that if it is obvious to "Questor" that technical views on a subject are necessarily suspect when they emanate from one employed on technical aspects of chemical engineering work by plant manufacturers it is not obvious to everybody. This type of argument belongs rather to dialectic than logic, and should be eschewed in serious discussion. Incidentally, the hint misses the mark rather more widely than "Questor" may have supposed. Herewith are brief notes on the points raised :—

Relative Material Costs.—Seeing that the gain on material costs is a balance on a total turnover of some £15 to £20 per ton of nitre, it is not surprising that the shift of prices can make big bites at the net balance as estimated from day to day. Recent price changes have resulted in a diminution of the monetary advantage, but the alteration is not in deference to any arguments on nitre potting; it is a matter of markets. The figure £3 11s. 6d. is not "amended"; it is simply more recent. It is even possible that the balance should temporarily be a net loss; but, if the writer's remarks on the broad market tendencies are well founded, the possibility of such a condition being permanent is becoming more remote as time goes on.

Nitre Cake.—The value of nitre cake is what can be got for it at makers' works. Carriage can kill its sale.

In the *J.S.C.I.*, September 30, 1921, page 208, an article appears on complete utilisation of nitre cake. The author appears to have been in a position to obtain clear information as to the possibilities of nitre-cake utilisation; and his general remarks are worth noting.

True, he values nitre cake for his process at 26s. 9d. in 1918, but later, before proposing transport of nitre cake to ammonium sulphate making plant, he would rather have it considered whether or not it would be cheaper to transport the ammonia as 25 per cent. liquor, after paying for the distillation. As a matter of strict fact, this alternative hardly ever could be cheaper—but what a choice of evils!

The writer would like to add that since the appearance of the last article on this subject he has again been in the presence of nitre cake in bulk awaiting a buyer who comes not, and the stock is gaining not at all in value as it waits.

Supervision.—"Questor's" remarks as to their standard of intelligence will no doubt be taken in a complimentary sense by chamber-men operating ammonia oxidation plant. Some of them may begin to inquire as to where the extra labour cost is going, if a specific item is put on the balance sheet to cover it. The original article sets this cost against labour costs in wheeling nitre and handling the potting charges.—Yours, etc.,

CHAS. COOPER.

Huddersfield,
September 4, 1922.

Chamber Plant for the Simultaneous Production of Oleum and Chamber Acid

To the Editor of THE CHEMICAL AGE.

SIR,—In the interesting article appearing in your issue of August 26 the author states that one of the chief causes of failure is the difficulty of starting the reaction with the low-grade sulphur dioxide gases emerging from the SO_2 absorption. Further on, he makes suggestions for overcoming this by means which do not add to the simplicity of the installation and, moreover, necessitate reheating the gases to a temperature at which they will react in a Glover tower.

It seems that here is an ideal case for the Roller or Splash Box system. In these boxes the gases are brought into very intimate contact with nitrous vitriol of proper strength and under suitable conditions, and it is found that extreme variations in the SO_2 content of the gases introduced have only the slightest effect on the efficiency of the boxes. A further advantage is that cold gases can be used; in fact, it is preferable that they be cold. No Glover tower is required; the nitrous oxides are recovered in ordinary Gay-Lussacs.

A Roller Box installation has now been in operation for some time at a copper smelting works using the gases from two copper convertors in which 40 per cent. copper matter is blown to blister copper. The SO_2 content of the gases varies from ·6 per cent. to 10·6 per cent. by volume according to the stage of the blowing, and it is found that these boxes are eminently suitable for just this class of work, where cold gas has to be treated of a very fluctuating SO_2 content. Furthermore, as the convertors only work six days a week the Roller Boxes are stopped at week-ends and re-started without entailing loss of nitre or production, as the reaction commences again as soon as the SO_2 gases are admitted.

This feature of extreme adaptability has also led them to be adapted in several instances where it is desired to have a safety device, as it were, which will come into action if for any reason the capacity of the existing plant has been temporarily overtaxed, causing escape of unconverted sulphur dioxide.

It seems that a properly designed Mannheim contact shaft followed by absorption towers and Roller Boxes offers a happy compromise between the pure contact plant and the time-honoured deservedly popular chamber system.—Yours, etc.,

H. J. BUSH.

18, Iddesleigh House, Caxton Street, Westminster.
September 1, 1922.

The Pasteur Commemoration Fund

To the Editor of THE CHEMICAL AGE.

SIR,—I am desired by Mr. A. Chaston Chapman, Hon. Treasurer (in this country) for the Pasteur Commemoration Fund, to inform you that the sum of £848 14s. 6d. has been subscribed to the Fund, and to send you a list of subscribers, to whom the British Committee have tendered their best thanks. A draft for the sum mentioned has been forwarded to Mons. Th. Héring, the general treasurer at Strasbourg.—Yours, etc.,

RICHARD B. PILCHER,
Registrar and Secretary.

The Institute of Chemistry,
30, Russell Square, W.C.1.

[COPY OF LETTER.]

Chemical Laboratories, 8, Duke Street,
Aldgate, E.C.3.
August, 1922.

DEAR SIR,—I have to inform you that a sum of £848 14s. 6d. has been subscribed to the above Fund, and you will find enclosed a list of the subscribers. This amount is in addition to sums which had previously been sent to France in response to earlier and direct appeals.

In accordance with a resolution passed at a recent meeting of the Pasteur Commemoration Committee, presided over by Sir Charles Sherrington, a draft for the above amount is being forwarded to Monsieur Héring, the general treasurer, with an intimation that should the amount prove more than the French committee desire to expend upon the monument, the excess should be devoted to some other form of permanent memorial of Pasteur in the University of Strasbourg. On behalf of the committee, I desire to take this opportunity of thanking you for your assistance.—Yours faithfully,

A. CHASTON CHAPMAN,
Treasurer and Secretary.

SUBSCRIPTIONS.

Ansells Brewery, Ltd., £50; Mr. Julian L. Baker, F.I.C., £1 1s.; Barclay, Perkins and Co., Ltd., £50; Professor G. Barger, D.Sc., F.R.S., £1 1s.; T. and J. Bernard, Ltd., £5 5s.; Boddingtons' Breweries, Ltd., £10 10s.; Brickwood and Co., Ltd., £5; Mr. Lawrence Briant, £1 1s.; Dr. Horace T. Brown, F.I.C., F.R.S., £2 2s.; Campbell, Hope and King, Ltd., £3 3s.; Mr. A. Chaston Chapman, Pres.I.C., F.R.S., £3 3s.; The Cheltenham Original Brewery Co., Ltd., £5; The City of London Brewery Co., Ltd., £21; Robert Deuchar, Ltd., £2 2s.; Mr. J. Doull, £1 1s.; Mr. H. E. Field, £2 2s.; Mr. J. S. Ford, F.I.C., £5 5s.; Professor Percy Frankland, C.B.E., F.I.C., F.R.S., £2 2s.; Friary, Holroyd and Healy's Breweries, Ltd., £5 5s.; Georges and Co., Ltd., £10 10s.; Groves and Whitnall, Ltd., £25; A. Guinness, Son and Co., Ltd., £100; Huggins and Co., Ltd., £5 5s.; The Hull Brewery

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Three-arc Furnace for Nitrogen Fixation

To the Editor of THE CHEMICAL AGE.

SIR,—When the Final Report of the Nitrogen Products Committee was published I was in the United States, and since returning have been able to investigate a paragraph which appeared on p. 241 in referring to my three-arc furnace for nitrogen fixation. After giving a description of the various features of the furnace the last two paragraphs read:

"As the result of trials with a small experimental furnace, it is considered commercially feasible to obtain yields about 50 per cent. higher than the usual yield of 50 to 60 gms. of HNO_3 per k.w. hour obtained with standard types of single phase furnaces. (*J.S.C.I.* 1915, Vol. 34, No. 3, and 1917, Vol. 36, No. 14.)

"According to the information available to the sub-Committee, the results of recent trials carried out with a three-phase furnace of about 300 k.w. capacity have not fulfilled the expectations based upon the working of the small scale experiments."

There is no doubt that the 300 k.w. furnace referred to is the one installed at Messrs. Kynochs' works at Birmingham in 1917, because it happens to be the only one I have designed of that size. It was carefully tested by Mr. H. Robinson, and I found that as soon as he knew of the above mentioned adverse paragraph he wrote to the Secretary of the Nitrogen Products Committee as follows:—

80, Aldridge Road, Birmingham.
January 28, 1920.

R. T. G. French, Esq., O.B.E., B.A.
Secretary to the Nitrogen Products Committee, London.

SIR,—On page 241 of the Final Report of the Nitrogen Products Committee, in the last paragraph referring to the Kilburn Scott Furnace, it is stated that information available to the sub-Committee on the performance of a 300 k.w. furnace did not bear out its claims of a yield of 50 per cent. above the usual 50 to 60 grams per k.w. I would like this statement to be corrected as far as possible to any parties interested in the matter. The 300 k.w. furnace was at the works of Messrs. Kynochs, Ltd., Birmingham, and I was responsible for the building and erection of the nitrogen plant and subsequent research on the nitrogen question. I had two long interviews with Dr. Harker of your Committee, who gave me helpful information and received from me information as to the working of the furnace as far as it had gone. Later I carried out considerable modifications in the design of details, which improved it in yield and reliability. My estimates were based on the readings of an electricity meter which was found to be reading 100 per cent. high, and this information was not obtained until February, and confirmed in March, 1919. The final results of this furnace proved the Kilburn Scott claim of 50 per cent. higher yield to be quite sound, and I personally have no doubt that this type of furnace will give more than 90 grams per k.w. hour. My confidence is based on the fact that I have obtained on several occasions over 100 grams per k.w. hour with an input of 120 k.w., which, owing to limitations on the plant, was the average power available during the research. I shall be pleased to give any further information which may be desired.—Yours respectfully,

(Signed) H. ROBINSON.

In June last I wrote to Mr. R. T. C. French, saying that, owing to being away in the States, I had recently seen a copy of the above and asking if anything could be done officially to correct the impression given by the paragraph in question. In the letter I said:—

"When the real tests were made, the readings of energy were read on an accurately calibrated Chamberlain and Hookham meter installed in the power house, and by observers who were quite independent of the tests, being made at the nitrate plant. This meter in the power house recorded all energy going to the furnace, its choke coils and pilot sparking device and energy auxiliary operations in the nitrate plant, and it should be noted that the energy of these accessories were relatively large, compared with the input of the furnace.

"In addition, the meter recorded the losses in the step up transformers and in ½-mile of cable between the power house and the nitrate plant, and this cable, etc., limited the input to the furnace to about 120 k.w. Even with these losses added in, yields over 100 grams were obtained, whereas I only claimed 50 per cent. increase on 50 to 60 grams."

I afterwards saw Mr. French, and he said that when the Report was published the Nitrogen Products Committee disbanded and correspondence arising out of the Report was merely filed away. Mr. H. Robinson has written me the following further explanation regarding the incorrect meter reading:—

"The power records could be obtained at two points; one on the low tension side of the system at Witton which thus included the losses in transformer, transmission line and choke coils, and the other at Holford on the high tension board which, for some reason never ascertained, read over 100 per cent. higher than the low tension board. As the high tension board readings were always available at a moment's notice and the readings from Witton were sometimes delivered a few days after registering, we used the Holford readings for comparison in our experimental work in building up efficiency in the furnace and towers.

"It was not until the beginning of 1919 that this matter was taken up, when standard instruments were installed to check the low tension board at Witton and a series of tests made with independent observers taking readings with the standard instrument and the low tension board instrument simultaneously with the Holford readings. These observations established the fact that the Holford meter read 2·02 times higher than the Witton end.

"Checking some of our past experience with this factor, we found we had obtained over 100 grams per kilowatt hour on several occasions. One 8-hours run for absorbtion experiments gave an average of 83 grams per kilowatt hour. We also had a satisfactory run at 93 grams per k.w.h. and at least two test records of 108 grams per k.w.h. appeared amongst the records."

I may mention that, even when the furnace was worked without the preheater or the cooling boiler, the average of a seven hours run was 83 grams per k.w. hour, and for this the k.w. reading included the losses in the step-up transformer and in ½ mile of cable from power house to nitrate plant. With these allowed for, the yield would be at least 1,070 higher.—Yours, etc.,

E. KILBURN SCOTT.

38, Claremont Square, London, N.1.
September 5, 1922.

The British Association: Annual Meeting at Hull

Principal Irvine's Address to the Chemistry Section

The nineteenth Annual Meeting of the British Association was opened at Hull on Wednesday, September 7, and will continue to Wednesday next. The address by the President (Professor Sir C. S. Sherrington) was delivered on the evening of the opening day, and the meetings of the various Sections began on Thursday. Principal Irvine's address to the Chemistry Section dealt with "The organisation of research" and the President's with "Some aspects of animal mechanism." Our report of the proceedings will be continued next week.

For his inaugural address on Thursday, the President of the Chemistry Section (Principal J. C. Irvine) took (1) "The organisation of research," and (2) "Some research problems in the carbohydrates." Beginning with a tribute to Sir David Brewster, whom he described as the founder of the British Association, he proceeded to review the position scientific chemistry has won since Brewster's day in public and official estimation.

Progress of Scientific Chemistry

It would be idle (he said) to recall the lowly position of chemistry as an educative force in this country, or to reconstruct the difficulties with which the scientific chemist was confronted during the first thirty years of the nineteenth century. In the early days of the British Association "schools" of chemistry were in their infancy, and systematic instruction in the science was difficult to obtain. Another point of fundamental importance is that the masters of the subject were then for the most part solitary workers. It is difficult for us, looking back through the years, to realise what it must have meant to search for truth under conditions which were discouraging, if not actually hostile. Yet, although his labours were often thankless and unrewarded, the chemist of the time was probably a riper philosopher and a finer enthusiast than his successor of to-day. He pursued his inquiries amidst fewer distractions, and in many ways his lot must have been happy, save when tormented by the thought that a subject so potent as chemistry in developing the intellectual and material welfare of the community should remain neglected to an extent which to us seems incredible. Public sympathy was lacking, Government support was negligible or grudgingly bestowed, and there was little or no co-operation between scientific chemistry and industry. As an unaided enthusiast the chemist was left to pursue his way without the stimulus, now happily ours, which comes from the feeling that work is supported by educated and enlightened appreciation.

Let me quote from one of Faraday's letters now in my possession and, so far as I can trace, unpublished. Writing to a friend immediately before the foundation of the British Association, he relates that a manufacturer had adopted a process developed in the course of an investigation carried out in the Royal Institution. The letter continues: "He" (the manufacturer) "writes me word that, having repeated our experiments, he finds the product very good, and as our information was given openly to the world he, as a matter of compliment, has presented me with some pairs of razors to give away." If ever there was a compliment which could be described as empty, surely this was one; yet the letter gives the impression that Faraday himself was quite content with his reward. It is perhaps unfair to quote Faraday as a type, for few men are blessed with his transparent simplicity of character, but there is obviously a great gulf fixed between the present day and a time when a debt of honour could be cancelled in such a manner. A little reflection will show that the British Association has played a useful part in discrediting the idea that because so much scientific discovery is given "openly to the world," those who profit by such discoveries should be absolved from their reasonable obligations. Even where scientific workers do not expect or desire personal reward, the institutions which provide them with their facilities are often sorely in need. The recognition, not yet complete, but more adequate than once was the case, that the labourer is worthy of his hire represents only one minor change which the years have brought.

An even greater contrast, embodying more important principles, is found in the changed attitude of the State towards scientific education and discovery. . . . Let us bridge the further gap of sixty-nine years which separates us from that day. The contrast is amazing, and once more we can trace the steady, persistent influence of the British Association in bringing about what is practically a revolution in public and official opinion. The change has come suddenly, but it was not spontaneous. Many years had to be spent in disseminating the idea that research is a vital necessity, and toward this end presidents of our Association have not hesitated, year after year, to add the weight of their influence and eloquence. It was courageous of them to do so. I would refer you particularly to the forcible appeals made by Sir James Dewar at Belfast and Sir Norman Lockyer at Southport, when the plea for more research was laid before the Association, and thus found its way by the most direct channel to the Press and to the public. No doubt many other factors have played a part in creating a research atmosphere in this country, but the steady pressure exerted by the British Association is not the least important of these influences.

The principles of science are to-day widely spread; systematic scientific training has found an honourable place in the schools and in the colleges; above all, there is the realisation that much of human progress is based on scientific inquiry, and at last this is fostered, and, in part, financed as a definite unit of national educational policy. Public funds are devoted to provide facilities for those who are competent to pursue scientific investigations, and in this way the State, acting through the Department of Scientific and Industrial Research, has assumed the double responsibility of providing for the advancement of knowledge and for the application of scientific methods to industry. Scientists have been given the opportunities they desired, and it remains for us to justify all that has been done.

Thanks to the wisdom and foresight of others, it has been possible to frame the Government policy in the light of the experience gained with pre-existing research organisations. The pioneer scheme of the kind is that administered by the Commissioners of the 1851 Exhibition, who since 1890 have awarded research scholarships to selected graduates. When in 1901 Mr. Carnegie's benefaction was applied to the Scottish Universities the trustees wisely determined to devote part of the revenues to the provision of research awards which take the form of scholarships, fellowships, and research lectureships. These have proved an immense boon to Scottish graduates, and the success of the venture is sufficiently testified by the fact that the Government Research scheme was largely modelled on that of the Carnegie Trust. In each of these organisations chemistry bulks largely, and the future of our subject is intimately connected with their success or failure. The issue lies largely in our hands.

Two Main Objectives

Two main objectives lie before us: the expansion of useful learning and the diffusion of research experience among a selected class. This class in itself will form a new unit in the scientific community, and from it will emerge the "exceptional man" to whom, quoting Sir James Dewar, "we owe our reputation and no small part of our prosperity." When these words were uttered in 1902 it was a true saying that "for such men we have to wait upon the will of Heaven." It is still true, but there is no longer the same risk that the exceptional man will fall by the way through lack of means. Many types of the exceptional man will be forthcoming, and you must not imagine that I am regarding him merely as one who will occupy a university chair. He will be found more frequently in industry, where his function will be to hand on the ideas inspired by his genius to the ordinary investigator.

I have no intention of wearying you by elaborating my views on the training required to produce these different types. The first step must be systematic experience in pure and disinterested research, without any reference to the more complicated problems of applied science. This is necessary, for if our technical research is to progress on sound lines the founda-

tions must be truly laid. I have no doubt as to the prosperity of scientific industries in this country so long as we avoid hasty and premature specialisation in those who control them. We may take it that in the future the great majority of expert chemists will pass through a stage in which they make their first acquaintance with the methods of research under supervision and guidance. The movement is already in progress. The Government grants are awarded generously and widely. The conditions attached are moderate and reasonable, and there is a rush to chemical research in our colleges. Here, then, I issue my first note of warning, and it is to the professors. It is an easy matter to nominate a research student; a laboratory comfortably filled with workers is an inspiring sight, but there are few more harassing duties than those which involve the direction of young research chemists. No matter how great their enthusiasm and abilities, these pupils have to be trained, guided, inspired, and this help can come only from the man of mature years and experience. I am well aware that scorn has been poured on the idea that research requires training. No doubt the word is an expression of intellectual freedom, but I have seen too many good investigators spoiled and discouraged through lack of this help to hold any other opinion than that training is necessary. I remember, too, years when I wandered more or less aimlessly down the bypaths of pointless inquiries, and I then learned to realise the necessity of economising the time and effort of others.

The duties of such a supervisor cannot be light. He must possess versatility; for although a "research school" will doubtless preserve one particular type of problem as its main feature, there must be a sufficient variety of topics if narrow specialisation is to be avoided. Remember, also, that there can be no formal course of instruction suitable for groups of students, no common course applicable to all pupils and all inquiries. Individual attention is the first necessity, and the educative value of early researches is largely derived from the daily consultations at the laboratory bench or in the library. The responsibility of becoming a research supervisor is great, and, even with the best of goodwill, many find it difficult to enter sympathetically into the mental position of the beginner. An unexpected result is obtained, an analysis fails to agree, and the supervisor, out of his long experience, can explain the anomaly at once, and generally does so. If the pupil is to derive any real benefit from his difficulties, his adviser must for the moment place himself in the position of one equally puzzled, and must lead his collaborator to sum up the evidence and arrive at the correct conclusion for himself. The policy thus outlined is, I believe, sound, but it makes sincere demands on patience, sympathy, and, above all, time.

Research supervision, if conscientiously given, involves the complete absorption of the director's energy and leisure. There is a rich reward in seeing pupils develop as independent thinkers and workers, but the supervisor has to pay the price of seeing his own research output fade away. He will have more conjoint papers, but fewer individual publications, and limitations will be placed on the nature of his work by the restricted technique of his pupils. I have defined a high standard, almost an ideal, but there is, of course, the easy alternative to use the technical skill of the graduate to carry out the more laborious and mechanical parts of one's own researches, to regard these young workers as so many extra pairs of hands. I need not elaborate the outcome of such a policy.

There is another temptation, and that, in an institution of university rank, is for the professor to leave research training in the hands of his lecturers, selecting as his collaborators only those workers who have passed the apprenticeship stage. This, I am convinced, is a mistake. Nothing consolidates a research school more firmly than the feeling that all who labour in its interests are recognised by having assigned to them collaborators of real ability.

I am not yet done with the professor and his staff, for they will have other matters to attend to if research schools are to justify their existence and to do more than add to the bulk of our journals. In many cases it will be found that the most gifted of the young workers under their care lack what, for want of a better expression, is known as "general culture." Remember these graduates have just emerged from a period of intensive study in which chemistry and the allied sciences have absorbed most of their attention. For their own sake and in the interests of our subject, they must be protected from the criticism that a scientific education is limited in outlook and leads to a narrow specialism. The research years are plastic years, and many opportunities may be found in the course of the daily consultations "to impress upon the student that there is literature other than the records of scientific papers, and music beyond the range of student songs." I mention only two of the many things which may be added to elevate and refine the research student's life. Others will at once occur to you, but I turn to an entirely different feature of research training, for which I make a special plea: I refer to the inculcation of business-like methods. You will not accuse me, I hope, of departing from the spirit of scholarship or of descending into petty detail, but my experience has been that research students require firm handling. Emancipated as they are from the restrictions of undergraduate study, the idea seems to prevail that these workers ought to be excused the rules which usually govern a teaching laboratory, and may therefore work in any manner they choose. It requires, in fact, the force of a personal example to demonstrate to them that research work can be carried out with all the neatness and care demanded by quantitative analysis. Again, in the exercise of their new freedom young collaborators are inclined to neglect recording their results in a manner which secures a permanent record and is of use to the senior collaborator. As a rule, the compilation of results for publication is not done by the experimenter, and a somewhat elaborate system of records has to be devised. It should be possible, twenty years after the work has been done, to quote the reasons which led to the initiation of each experiment, and to trace the source and history of each specimen analysed, or upon which standard physical constants have been determined. I need not enter into detail in this connection beyond stating that, although a system which secures these objects has for many years been adopted in St. Andrews, constant effort is required to maintain the standard.

One of the greatest anxieties of the research supervisor is, however, the avoidance of extravagance and waste. The student is sometimes inclined to assume a lordly attitude and to regard such matters as the systematic recovery of solvents beneath his notice. My view is that, as a matter of discipline as much as in the interests of economy, extravagant working should not be tolerated. There is naturally an economic limit where the time spent in such economies exceeds in value the materials saved, and a correct balance must be adjusted. It is often instructive to lay before a research worker an estimate of the cost of an investigation in which these factors of time and material are taken into account. As a general rule it will be found that the saving of material is of greater moment than the loss of time. The point may not be vitally important in the academic laboratory, but in the factory, to which most of these workers eventually migrate, they will soon have the lesson thrust upon them that their time and salary bear a small proportion to costs of production.

You will see I have changed my warning from the professor to the student. A student generation is short. In a few years, when almost as a matter of course the best of young chemists will qualify for the Doctor of Philosophy degree, it will be forgotten that these facilities have come to us, not as a right, but as a privilege. Those who reap the advantages of these privileges must prove that the efforts made on their behalf have been worth while.

Looking at the position broadly, if one may criticise the research schemes of to-day, it is in the sense that the main bulk of support is afforded to the research apprentice, and the situation has become infinitely harder for the supervisor in that new and onerous tasks are imposed upon him. To expect him to undertake his normal duties and, as a voluntary act, the additional burden of research training is to force him into the devastation of late hours and overwork. The question is at once raised—Are we using our mature research material to the best advantage, and is our policy sufficiently focussed on the requirements of the experienced investigator? I think it will generally be agreed that members of the professor or lecturer class who join in the movement must be relieved in great measure of teaching and administrative work. I am decidedly of the opinion that the research supervisor must be a teacher, and must mingle freely with undergraduates, so as to recognise at the earliest possible stage the potential

investigators of the future and guide their studies. To meet this necessity universities and colleges must realise that their curriculum has been extended and that staffs must be enlarged accordingly. There could then be definite periods of freedom from official duties for those who undertake research training as an added task. Opportunities must also be given to these "exceptional men" to travel occasionally to other centres and refresh themselves in the company of kindred workers. It is evident that our universities are called upon to share the financial burden involved in a National Research scheme to a much greater extent than possibly they know.

Conclusions

I may perhaps summarise some of the conclusions I have reached in thinking over these questions. The first and most important is that in each institution there should be a Board or Standing Committee entrusted with the supervision of research. The functions of such a body would be widely varied and would include :—

1. The allocation of money voted specifically from university or college funds for research expenses.
2. The power to recommend additions to the teaching staff in departments actively engaged in research.
3. The recommendation of promotions on the basis of research achievement.
4. The supervision of regulations governing higher degrees.

Among the more specific problems which confront this Board are the following :—

1. The creation of research libraries where reference works can be consulted immediately.
2. The provision of publication grants, so that where no periodical literature is available the work will not remain buried or obscure.
3. The allocation of travelling grants to enable workers to visit libraries, to inspect manufacturing processes, and to attend meetings of the scientific societies.

I have dealt merely with the fringe of the question, but would add that there is one thing which a Research Board should avoid.

It is, I am convinced, a mistake for a governing body to call for an annual list of publications from research laboratories. Nothing could be more injurious to the true atmosphere of research than the feeling of pressure that papers must be published or the Department will be discredited.

Research Problems in the Carbohydrates

In the second part of his address the President gave an account of the researches upon which his co-workers are at present engaged in connection with cellulose, starch, and inulin. It included sections dealing with "cellulose" (with Dr. W. S. Denham and Dr. E. L. Hirst), "Starch" (with Mr. John Macdonald), "Synthetic dextrins" (with Mr. J. W. H. Oldham), and "Inulin" (with Dr. Ettie S. Steele, Mr. G. McOwan, and Miss M. I. Shannon). In concluding the President said :—

The structural discussion which I have had the honour to lay before you on one of the most important groups of natural compounds is admittedly incomplete, and no claim is made that the formulæ now submitted are final. But they at least indicate a new development in the chemistry of polysaccharides, and lines of further research are opened out which promise in time to reveal the intimate constitution of these substances. Much reliance has been placed on the validity of the methylation process as a means of determining structure, but it has to be remembered that most speculation of the kind on carbohydrates is now based on results obtained by this one particular method. The structure of glucosides, the nature of γ-sugars, the constitution of sucrose, maltose, and cellobiose, are all involved in current discussions on this subject, and all are based on the properties of the simple alkylated sugars.

Numerous details, such as the specific reactions of the individual hydroxyl groups in carbohydrate units, have still to be settled before the further problem of the polymerisation of polysaccharides can be adequately dealt with, but many features, for the most part unexpected, have been revealed.

The polysaccharides, like many other research fields, are, after all, not so complicated as they appeared when viewed from afar, and the close relationship now established between cellulose and starch, starch and lactose, inulin and sucrose, will, it is hoped, play a part in bringing within the range of exact experiment the structural study of all types of natural compounds related to the simple sugars.

Synthetic Fats

Following the President's address a number of papers were submitted. The first was by Dr. Helen S. Gilchrist on "The preparation and constitution of synthetic fats containing a carbohydrate chain," which is briefly summarised below.

The products obtained when a carbohydrate chain is coupled with the unsaturated groups characteristic of natural fats have been studied with the object of establishing the constitution of the synthetic fats thus obtained. As shown by Lapworth and Pearson, α-methylglucoside and mannitol both combine, on heating in the presence of sodium ethoxide, with the oleyl residues of olive oil, thereby liberating glycerol. The present research has proved that in the first case a mono-oleate is initially formed, whilst in the second two oleyl groups enter the hexitol chain. This condensation is immediately followed by internal dehydration, the carbohydrate chain, in each case, losing one molecule of water, the fatty residues remaining intact. Anhydro-methylglucoside mono-oleate and mannitan di-oleates are definite chemical individuals. On methylation they yield monomethyl derivatives, which, however, are unstable even in the high vacuum of the Gaede pump. On being heated with acid alcohol these methylated compounds each give methyl oleate, together with an alkylated sugar derivative. In both cases the anhydro ring in the molecule persists during hydrolysis, and thus a passage is opened into the series of anhydro-sugar derivatives and alcohols. Examination of the above cleavage products confirms the views already held regarding the mechanism of the reactions discussed, and complete structural formulæ are assigned to the original "methylglucoside" and "mannitol fats."

The Composition of Esparto Cellulose

In Dr. E. L. Hirst's paper on this subject it was shown that esparto grass, after removal of waxes, lignins, etc., in the ordinary course of paper-making, gives a material which is homogeneous and is similar to cotton cellulose in appearance but differs markedly in that it gives on distillation with 12 per cent. aqueous hydrochloric acid an amount of furfural corresponding to the presence of 18 to 20 per cent. of a pentosan. Acetylation of this esparto cellulose cannot be effected so readily as in the case of cotton cellulose, but by slight modification of Barnett's method, in which sulphuryl chloride is used as a catalyst, almost quantitative yields of acetates have been obtained without appreciable loss of the pentose residue as shown by furfural estimations. This acetate mixture has been subjected to the action of acid methyl alcohol in sealed tubes at 130° C., when it is found that after prolonged digestion practically the whole of the material dissolves and the solution then contains methylglucoside along with a proportion of a methyl pentoside. The pentose has been identified as xylose, and confirmation of this has been obtained by the isolation from esparto cellulose of a pentosan which on hydrolysis is converted into a reducing sugar identical with ordinary xylose. In the course of quantitative experiments esparto cellulose has thus been converted into methylglucoside and methylxyloside in such a manner that 90 per cent. of the whole material can be accounted for. On the assumption that no other hexose or pentose is present, the analytical results indicate that the overall yield of methylglucoside is 95 per cent. and that of methylxyloside 68·5 per cent. of the theoretical amount. The loss in yield, as indicated by the results of control experiments, is due to the destruction of pentose owing to furfural formation during the digestion in the sealed tubes. The evidence therefore points to esparto cellulose being, to the extent of 90 per cent. at least, a definite chemical substance composed of glucose residues and xylose residues present together in the proportions of 80 per cent. and 20 per cent. respectively.

Professor Sir W. H. Bragg submitted a paper on "The crystalline structure of organic compounds," and in the afternoon there was a joint discussion with Section K (Botany) on "Photo-synthesis."

The President's Address

"Some Aspects of Animal Mechanism"

THE President (Professor Sir C. S. Sherrington) delivered his address on Wednesday evening, taking as his subject "Some Aspects of Animal Mechanism." The following extract is taken from a comprehensive and most interesting treatment of the question :—

Could we look quite naïvely at the question of a seat for the mind within the body we might perhaps suppose it diffused there, not localised in any one particular part at all. That it is localised and that its localisation is in the nervous system—can we attach meaning to that fact? The nervous system is that bodily system whose special office from its earliest appearance onward throughout evolutionary history has been more and more to weld together the body's component parts into one consolidated mechanism reacting as a unity to the changeful world about it. It more than any other system has constructed out of a collection of organs an individual of unified act and experience. It represents the acme of accomplishment of the integration of the animal organism. That it is in this system that mind, as we know it, has had its beginning, and with the progressive development of the system has step for step developed, is surely significant. So is it that in this system the portion to which mind transcendently attaches is exactly that where are carried to their highest pitch the nerve-actions which manage the individual as a whole, especially in his reactions to the external world. There, in the brain, the integrating nervous centres are themselves further compounded, inter-connected, and re-combined for unitary functions. The cortex of the forebrain is the main seat of mind. That cortex with its twin halves corresponding to the two side-halves of the body is really a single organ knitting those halves together by a still further knitting together of the nervous system itself. The animal's great integrating system is there still further integrated. And this supreme integrator is the seat of all that is most clearly inferable as the animal's mind. As such it has spelt biological success to its possessors. From small beginnings it has become steadily a larger and larger feature of the nervous system, until in adult man the whole rest of the system is relatively dwarfed by it. Not without significance, perhaps, is that in man this organ, the brain cortex, bifid as it is, shows unmistakable asymmetry. Man is a tool-using animal, and tools demand asymmetrical, though attentive and therefore unified, acts. A nervous focus unifying such motor function will, in regard to a laterally bipartite organ, tend more to one half or the other. In man's cerebrum the preponderence of one half, namely, the left, over the other may be a sign of unifying function.

It is to the psychologist that we must turn to learn in full the contribution made to the integration of the animal individual by mind. But each of us can, without being a professed psychologist, yet recognise one achievement in that direction which mental endowment has produced. Made up of myriads of microscopic cell-lives, individually born, feeding and breathing individually within the body, each one of us nevertheless appears to himself a single entity, a unity experiencing and acting as one individual. In a way the more far-reaching and many-sided the reactions of which a mind is capable the more need, as well as the more scope, for their consolidation to one. True, each one of us is in some sense not one self, but a multiple system of selves. Yet how closely those selves are united and integrated to one personality. Even in those extremes of so-called double personality one of their mystifying features is that the individual seems to himself at any one time wholly either this personality or that, never the two commingled. The view that regards hysteria as a mental dissociation illustrates the integrative trend of the total healthy mind. Circumstances can stress in the individual some perhaps lower instinctive tendency that conflicts with what may be termed his normal personality. This latter, to master the conflicting trend, can judge it in relation to his main self's general ethical ideals and duties to self and the community. Thus intellectualising it, he can destroy it or consciously subordinate it to some aim in harmony with the rest of his personality. By so doing there is gain in power of will and in personal coherence of the individual. But if the morbid situation be too strong or the mental self too weak, instead of thus assimilating the contentious element the mind may shun and, so to say, endeavour to ignore it. That way lies danger. The discordant factor escaped from the sway of the conscious mind produces stress and strain of the conscious self; hence, to use customary terminology, dissociation of the self sets in, bringing in its train those disabilities, mental or nervous, or both, which characterise the sufferer from hysteria. The normal action of the mind is to make up from its components one unified personality. When we remember the manifold complexity of composition of the human individual, can we observe a greater instance of solidarity of working of an organism than that presented by the human individual intent and concentrated, as the phrase goes, upon some higher act of strenuous will? Physiologically the supreme development of the brain, physiologically the mental powers attaching thereto, seem to represent from the biological standpoint the very culmination of the integration of the animal organism.

The mental attributes of the nervous system would be, then, the coping-stone of the construction of the individual. Surveyed in their broad biological aspect, we see them carrying integration even further still. They do not stop at the individual; they proceed beyond the individual; they integrate from individuals communities. When we review, as far as we can judge it, the distribution of mind within the range of animal forms, we meet two peaks of its development—one in insect life, the other in the vertebrate, with its acme finally in man. True, in the insect the type of mind is not rational but instinctive, whereas at the height of its vertebrate development reason is there as well as instinct. Yet in both one outcome seems to be the welding of individuals into societies on a scale of organisation otherwise unattained. The greatest social animal is man; the powers that make him so are mental. Language, tradition, instinct for the preservation of the community, as well as for the preservation of the individual. Reason actuated by emotion and sentiment and controlling and welding egoistic and altruistic instincts into one broadly harmonious, instinctive-rational behaviour. Just as the organisation of the cell-colony into an animal individual receives its highest contribution from the nervous system, so the further combining of animal individuals into a multi-individual organism, a social community, merging the interests of the individual in the interests of the group, is due to the nervous system's crowning attributes, the mental. That this integration is still in process, still developing, is obvious from the whole course of human pre-history and history. The biological study of it is essentially psychological; it is the scope and ambit of social psychology. Not the least important form of social psychology is that relatively new one, of which the President of the Psychology Section at this meeting is a foremost authority and exponent, namely, that dealing with the stresses and demands that organised industry makes upon the individual as a unit in the community of our day, and with the readjustments it asks from that community.

To resume, then, we may conclude that in some of its aspects animal life presents to us mechanism the how of which, despite many gaps in our knowledge, is fairly explicable. Of not a few of the processes of the living body, such as muscular contraction, the circulation of the blood, the respiratory intake and output by the lungs, the nervous impulse and its journeyings, we may fairly feel from what we know of them already that further application of physics and chemistry will furnish a competent key. We may suppose that in the same sense as we can claim to-day that the principles of working of a gas-engine or an electro-motor are comprehensible to us, so will the bodily working in such mechanisms be understood by us, and indeed are largely so already. It may well be possible to understand the principle of a mechanism which we have not the means or skill ourselves to construct. We cannot construct the atoms of a gas-engine. But, turning to other aspects of animal mechanism, such as the shaping of the animal body, the conspiring of its structural units to compass later functional ends, the predetermination of specific growth from egg to adult, the predetermined natural term of existence, these and their intimate mechanism, we are, it seems to me, despite many brilliant inquiries and inquirers, still at a loss to understand. The steps of the results are known, but the springs of action still lie hidden. Then again, the how of the mind's connection with its bodily place seems still utterly enigma. Similarity or identity in time-relations and in certain other ways between mental and nervous processes does not enlighten us as to the actual nature of the connection existent between

the two. Advance in biological science does but serve to stress further the strictness of the nexus between the two.

Great differences of difficulty therefore confront our understanding of different aspects of animal life. Yet the living creature is fundamentally a unity. In trying to make the how of an animal existence intelligible to our imperfect knowledge we have for purposes of study to separate its whole into part-aspects and part-mechanisms, but that separation is artificial. It is as a whole, a single entity, that the animal, or for that matter the plant, has finally and essentially to be envisaged. We cannot really understand its one part without its other. Can we suppose a unified entity which is part mechanism and part not? One privilege open to the human intellect is to attempt to comprehend, not leaving out of account any of its properties, the how of the living creature as a whole. The problem is ambitious, but its importance and reward are all the greater if we seize and we attempt the full width of its scope. In the biological synthesis of the individual it regards mind. It includes examination of man himself as acting under a biological trend and process which is combining individuals into a multi-individual organisation, a social organism surely new in the history of the planet. For this biological trend and process is constructing a social organism whose cohesion depends mainly on a property developed so specifically in man as to be, broadly speaking, his alone, mainly, a mind actuated by instincts but instrumented with reason. Man, often Nature's rebel, as Sir Ray Lankester has luminously said, can, viewing this great supra-individual process, shape even as individual his course conformably with it, feeling that in this instance to rebel would be to sink lower rather than to continue his own evolution upward.

Chemical Workers' Bravery

Award of King's Medal to Sunderland Employees

THE King has awarded the Edward medal to William King and Thomas Atkinson Whitehead, two employees of Brotherton and Co., Ltd., tar distillers, of South Dock, Sunderland, for their bravery in attempting to rescue two fellow workmen who were suffocated by sulphuretted hydrogen at the bottom of a a large still.

The circumstances are recounted in the *London Gazette* of Tuesday. While one of the stills, which are 10 ft. in diameter and 20 ft. deep, was standing empty, a workman descended it by a rope ladder through the small manhole in the cover. When he reached the bottom he collapsed. His mate, realising that gas must have accumulated in the still, shouted for help and ran to get a rope. A workman, named George Rogers, without waiting for a rope, immediately went down the still to the rescue, but he also was overcome. William King at once entered the still with a handkerchief round his mouth and a rope attached to his body. He was overcome and had to be pulled out. Thereupon Whitehead made two attempts to reach the men, first equipped with a gauze respirator and then with a hood with oxygen pumped into it, but on both occasions he had to be pulled out. King then made a further attempt, wearing a respirator and having a safety-belt round his body. By this time other workmen had removed the pitch-pipe from the bottom of the still and began to force air in, and King was able to attach ropes to the bodies, and they were drawn out. Artificial respiration was tried, but they were found to be dead.

The danger due to sulphuretted hydrogen accumulating in the still was well-known by King and Whitehead. They acted promptly and courageously and showed coolness and intelligence in the measures taken for the attempted rescue of their fellow-workmen.

Goodlass Wall and Co's Annual Meeting

A DIVIDEND of 6¼ per cent., less tax, was declared at the third annual general meeting of Goodlass, Wall and Co., Ltd., held at Liverpool on August 31. Mr. John Byrne (the chairman), drew attention to the taxation which this company, like all others, has been subjected to, and pointed out that it was the duty of every individual shareholder in his personal capacity to make protest against such a heavy burden imposed upon industry. With relief in this direction he was confident that the trade of the country, both for home and export, would materially improve.

Alby United Carbide Factories

Statement by the Official Receiver

A SUMMARY of the statement of affairs of the Alby United Carbide Factories, Ltd., dated August 30, shows gross liabilities £643,678, of which £467,260 is expected to rank, and net assets £51,853, leaving a deficiency of £415,406. The paid-up capital is £2,301,728, to which has to be added the above deficiency of £415,406, making a total deficiency of £2,717,135.

The observations signed by Mr. H. E. Burgess, Senior Official Receiver, follow very closely the lines of the statement he made at the recent meeting of creditors of the company. The history of the concern is summarised from its registration in April, 1905, by Mr. Alfred Ernest Barton, with a nominal capital of £25,000, to the appointment of the provisional liquidator in February, 1922.

In this later statement the free assets are estimated to realise £75,706. The investments in A./S. Gigant, A./S. Aura, Nitrogen Fertilisers, Ltd., and most of the Norwegian subsidiary companies are not estimated to be of any value. The good book-debts, estimated to realise £25,074, are chiefly in respect of sales of carbide stock. The bad and doubtful debts, amounting to £813,947 0s. 11d., are not estimated to realise anything, and consist chiefly of the A./S. Aura debt for £801,180 3s. 11d.

There is an estimated surplus of £22,798 16s. 2d. from securities in hands of fully-secured creditors. Partly-secured creditors, £383,285 17s. 1d., holding securities valued at £118,048 4s. 5d. Unsecured creditors, £202,023 4s. 2d., include a claim of £168,197 9s. 9d. in respect of a loan from the North-Western Cyanamide Co., Ltd.

The cause of the company's failure is attributed by the directors to the long-period contracts eventually proving too burdensome. In view of the heavy liabilities there is no prospect of any return of capital to the shareholders.

Iron and Steel Institute

Autumn Meeting at York

THE autumn meeting of the Iron and Steel Institute opened on Tuesday at York, and was continued on Wednesday. The president, Mr. Francis, was in the chair, and the conference was largely attended by delegates from all parts of the country.

In a paper read on Tuesday, Mr. A. K. Reese outlined the bases upon which modern blast furnace practice has been built up, and endeavoured to show how those bases supplied logical arguments for their adoption. The object of modern blast furnace practice resolved itself into the attainment of the greatest possible quantity consistent with quality.

Professor H. Louis said that the dry blast treatment was first introduced and practically demonstrated in Great Britain and not in the U.S.A., as had been suggested. He doubted whether the author's statement on quantity and quality was sound. He was of the opinion that the object should be the greatest possible economy consistent with quality; economy and quality were by no means identical.

Mr. G. Barrett advocated the grading of limestone, and Mr. Herbert Scott emphasised the necessity of installing proper equipment for the working of blast furnaces.

Experimental work on the nitrogenisation of iron and steel by sodium nitrate was described by Mr. L. E. Benson. To obtain positive evidence of nitrogenisation both unannealed and annealed specimens of "Armco" iron were analysed for nitrogen. A sample before annealing contained less than ·002 per cent. nitrogen, and a specimen annealed for ten hours exhibited a nitride structure to an average depth of ·4 millimetre. As a result of further experiments it appeared that the specimens had become nitrogenised through being annealed at 500° C. in a salt bath containing sodium nitrate. As sodium nitrate is frequently the chief constituent of salt baths for low-temperature heat treatment, the author thought it was advisable to investigate how far nitrogenisation was likely to affect iron and steels under varying conditions. Mr. Benson gave some interesting figures showing the influence of time on the rate of penetration of nitrogen in "Armco" iron up to eighty hours, and in various steels up to twenty hours. In the case of the iron, penetration was comparatively rapid during the first few hours, but after fifteen to twenty hours the rate remained practically constant at ·02 millimetre per hour. The rate of penetration in steel appeared to be considerably slower than in pure iron.

Brazilian Centenary Exhibition

Fine Display of British Chemical Preparations

THE Brazilian Centenary Exhibition at Rio de Janeiro, the scope and object of which were referred to at some length in THE CHEMICAL AGE some time ago, was officially opened on Thursday and will remain open until December. British manufacturers generally are well represented in the British Pavilion where the exhibits of a number of British chemical manufacturers are to be found.

Brunner, Mond, and Co., Ltd., are showing a wide range of chemicals including soda ash, bicarbonate of soda, caustic soda, soda crystals, calcium chloride, various grades of sodium silicate, muriate, sulphate and carbonate of ammonia, chloracetic acid, hexachlorethane, westropol, bleaching powder, bichlorethylene, synthetic hydrochloric acid, bichromate of soda and potash, etc.

Chemical products of all kinds are displayed by the United Alkali Co., Ltd., the principal items in their exhibit being acetic acid, ammonia alkali, bicarbonate and soda, chloride of lime, caustic soda, chlorate of potash, sulphite of soda, and sulphuric acid.

Nobel Industries, Ltd., have a very representative exhibit in the explosives section, which includes dummy samples of the grades most generally used in South America. Other interesting exhibits are gold and aluminium bronze powders in various shades, carbon-free metals and alloys, and "Thermit" welding compound. Among the collodion exhibits made in England by Necol Industrial Collodions, Ltd., is "Necol" plastic wood, a mouldable substance which hardens on exposure to the air.

Various brands of Portland cement form the exhibit of the Associated Portland Cement Manufacturers, Ltd., while Babcock and Wilcox, Ltd., show models of their patented water-tube boiler and other specialities. Baiss Brothers and Co., Ltd., display a selection of fine chemicals, essences, and essential oils; and paints, colours, and varnishes fill the space occupied by Blundell, Spence and Co., Ltd. Other paint exhibits comprise metallic paints, by Farquhar and Gill, Ltd., and the Improved Metallic Paints, Ltd., varnishes, paints, and enamels by Griffiths Brothers Co. (London), Ltd., Robert Ingham Clark and Co., Ltd., and A. Crosbie and Co.

An electrolyser for bleaching purposes and for use in connection with the refining of oil, is one of the features of the exhibit of Mather and Platt, Ltd., who also show the "Vortex" humidifier, aniline agers, chemical fire extinguishers, etc. Samples of caustic soda (solid and powdered), silicate of soda, and glycerine are to be seen at the stand of Joseph Crosfield and Sons, Ltd., while perfumery, toilet preparations, etc., are the principal exhibits of the Erasmic Co., Ltd., and the Crown Perfumery Co., Ltd.

Institution of Chemical Engineers

AT the twelfth meeting of the Provisional Committee held at 166, Piccadilly, London, Sir Arthur Duckham, K.C.B., M.I.C.E., presiding, it was reported by the solicitor that the registration of the Institution by the Board of Trade was still delayed.

The suggestions of the Institute of Chemistry were agreed to, viz., That the definition of Chemical Engineering should be omitted, and that a clause should be inserted by which the Institution claim no right to prescribe courses of study or *to hold examinations* whereby qualifications or authority to practice or to use any distinctive title can or may be conferred in respect of the practice as such of analytical or technical chemists (other than chemical engineers) or of teachers of chemistry.

The committee were unanimously opposed to changing the title of the Institution.

A balance sheet and revenue account was submitted by the honorary treasurer, showing a surplus balance of £225 6s. 8d.

The honorary secretary reported that over 100 completed application forms for membership had already been received. It was agreed that the question of membership must be held in abeyance until negotiations were completed by the Board of Trade, which it was hoped would be in about six weeks from the date of this meeting.

The next meeting of the committee was fixed for September 20.

Proposed Paint and Varnish Institute

Inaugural Dinner in London

IT has been decided to hold a dinner in London very shortly to inaugurate the Institute of Paint and Varnish Technologists. Briefly the chief aims of the Institute will be directed towards

1. Dissemination of practical and scientific knowledge by reading and discussion of papers, which will be published in the Journal.
2. Technical education improvements.
3. Formation of a technical library and reading room.
4. Maintaining close liaison with the Government, public and professional bodies, institutions, and societies interested in the products of the industry and problems of application.
5. Research.

The Institute would work much on the lines of the American Society, which has already done such valuable work for the industry in that country.

A good response has been received from those engaged in the industry, and it is hoped that members of the Paint and Varnish Society, the Oil and Colour Chemists Association, and other similar organisations in the country will join, thus ensuring a vigorous national institution.

The following, amongst others, have already promised their support:—Sir Ernest J. P. Benn, Bart. (chairman of Benn Brothers, Ltd.), Dr. Bennett Blackler, Ph.D; G. De Pierres; J. Newton Friend, D.Sc., Ph.D.; Chas. Harrison; Noel Heaton, B.Sc., F.C.S.; A. Seymour Jennings, F.I.B.D.; C. A. Klein; Professor A. P. Laurie; Dr. R. S. Morrell, M.A., Ph.D., F.I.C.; Dr. F. Mollwo Perkins, C.B.E., Ph.D., F.I.C., F.C.S.; Walter F. Reid, F.I.C., F.C.S.; J. Cruickshank Smith, B.Sc., F.C.S.; S. K. Thornley; Oliver Wilkins.

Those desirous of attending the dinner or assisting, are asked to communicate with Mr. H. D. Bradford, hon. secretary, 42, Ribblesdale Road, S.W.16.

Fumes from Artificial Fertiliser Works

BEFORE Mr. Justice Swift in the Vacation Court, on August 30, a motion was heard in which the Attorney-General, at the relation of the Barnet Rural District Council, asked for an injunction to restrain the defendants, the Elstree Chemical Works (1922), Ltd., until trial of the action, from committing a public nuisance by way of smell. Mr Hurst, K.C., for the plaintiffs, said the defendants carried on the business of making artificial fertilisers out of leather, wool and felt waste. The process gave rise to strong effluvia which penetrated for a quarter of a mile from the works and remained through the night. Mr. Turnbull, for the defendants, asked that his clients should be given further time to abate what he was prepared to admit was a nuisance. His clients had only carried on the business since March, and had made several attempts to eliminate the smell. The parties agreed to treat the motion as the trial of the action, and his Lordship granted a perpetual injunction to restrain the nuisance, but suspended its operation for a month to enable the defendants to take the steps they proposed.

Sir John Cass Technical Institute

THE new session of the Sir John Cass Technical Institute, Jewry Street, Aldgate, London, E.C.3, will commence on Monday, September 25, and students will be enrolled during the previous week, commencing Monday, September 18, between 6.30 and 8.30 p.m. The courses of instruction at the Institute meet the requirements of those engaged in chemical, metallurgical, electrical, petroleum, and the fermentation industries. Full facilities are provided in the well-equipped laboratories of the Institute for special investigations and research. The instruction in experimental science also provides systematic courses for the examinations of London University and of the Institutes of Chemistry and Physics. Special courses of higher technological instruction form a distinctive feature of the work of the Institute, and for the forthcoming session these include brewing, malting, micro-biology, petroleum technology, colloids, alternating currents and electrical oscillations, mathematical statistics, metallography and pyrometry, heat treatment and mechanical testing of metals and alloys, and foundry practice.

From Week to Week

A CHIEF ANALYTICAL CHEMIST is required by Lever Brothers, Ltd., Port Sunlight.

BRIGADIER-GENERAL B. R. HEPBURN has been appointed chairman of the General Petroleum Co., of Trinidad.

THE NEW EXTENSION of the chemical departments of the University of Liverpool will be opened on October 5.

DR. C. L. PARSONS, secretary of the American Chemical Society, has arrived in the U.S.A. after his tour of Europe.

THE DEATH is announced of Mr. E. F. Stone, for many years head of Stone and Son, Ltd., manufacturing chemists, Exeter.

MR. J. A. V. BUTLER, M.Sc. (Birmingham), has been appointed Assistant Lecturer in Chemistry at the University College of Swansea.

DEPOSITS OF ARSENIC, estimated to be worth a very considerable amount of money, are reported to have been discovered at Gerona, Spain.

A GRANT of £50 offered by the trustees of the Ida Freund Memorial Fund to a teacher of physics for purposes of travel and study has been awarded to Miss E. M. Ridley.

A MARRIAGE has been arranged and will shortly take place between Major H. G. Brackley, D.S.O., and Miss F. H. Mond, elder daughter of Mr. Robert Mond, of Combe Bank, Sevenoaks.

MR. GEORGE W. PATON, deputy chairman and managing director of Bryant and May, Ltd., has been appointed chairman and managing director of Maguire, Paterson and Palmer, Ltd.

MR. ERNEST A. SMITH has resigned from the secretaryship of the British Non-Ferrous Metals Research Association, and has accepted an appointment as research metallurgist to the Sheffield Smelting Co., Ltd.

A JUNIOR DEMONSTRATORSHIP is vacant in the department of physics at the East London College, Mile End Road, London. Particulars of the appointment are obtainable from Mr. E. J. Wignall, registrar.

A CONTEMPORARY recalls that Captain Macmillan, who has been taking part in the recent attempt to fly round the world, was formerly with Thomas Henderson and Co., Ltd., chemical brokers, Wellington Street, Glasgow.

THE COMMITTEE under Part VI. of the Safeguarding of Industries Act have arranged to hold their next sitting for the hearing of evidence on vulcanised fibre at noon on September 12 at 5, Old Palace Yard, Westminster.

THE MELLON INSTITUTE, of Pittsburg, U.S.A., is conducting an extensive research into the properties of acetone as a solvent. Information regarding the results of this work is available through the director of the Institute.

THE SALTERS' INSTITUTE OF INDUSTRIAL CHEMISTRY has awarded fellowships for post-graduate study to Messrs. C. G. Harris, W. S. Martin, J. H. Oliver, and W. Randerson, and has renewed the fellowship of Mr. F. Raymond Jones.

CAPTAIN G. P. THOMSON, the only son of Professor Sir J. J. Thomson, has been appointed to the chair of Natural Philosophy at Aberdeen University. He was latterly a lecturer in physics, and spent much time on research work in the Cavendish Laboratory.

GERMAN WORKMEN in the Badische Anilin und Sodafabrik Works are said to be demanding a discontinuation of piece and bonus work. Their demands also include free insurance, substantial pensions, and the delegation of more authority to their shop councils.

AMONG THE PAPERS to be read at the Congress of the Incorporated Sanitary Association of Scotland, which opened in Rothesay on Wednesday, is one by Mr. F. W. Harris, F.I.C., City Analyst of Glasgow, on "Some Aspects of the Sewage Purification Problem."

THE COUNCIL of the League of Nations, according to an Exchange message from Geneva, has decided to request England, Australia and New Zealand to supply a further explanation as to their alleged intention to lay phosphate deposits on Nauru Island.

MR. R. R. COATES, who recently commenced business as an importer of drugs and chemicals under the style of Dick, Coates and Co., 41, Great Tower Street, London, has been appointed United Kingdom representative of the Société Chimique des Usines du Rhone.

STEAUA ROMANA (BRITISH) LTD., have received cable advice from the Steaua Romana Co., of Bucharest, that the production of their well No. 261 at Runeu, which has recently been deepened, increased about August 16 to 40 tons a day. On August 26 this well was reported to be producing 300 tons a day.

A SWISS CONTEMPORARY describes a new process for the direct reduction of nitrogen to ammonia. The reduction is said to take place in diluted sulphuric acid under pressure in contact with freshly coated platinum cathodes. The yield only amounts to about 0·3 mg. of ammonia in 160 ampere minutes at 200 atmospheres pressure.

LICENCES were granted during July for the importation into the U.S.A. of 195,482 lb. of foreign dyes. Germany supplied 130,386 lb., against 214,514 lb. supplied in June; Switzerland sent 47,406 lb., against 182,631 lb.; and the United Kingdom furnished 17,690 lb., as compared with 4,000 lb. in June. The British dyes included 3,500 lb. of alizarine colours.

THE TOTAL INDIAN IMPORTS of dyestuffs obtained from coal tar during April, May and June fell in value from 99 to 62 lakhs of rupees, according to H.M. Senior Trade Commissioner at Calcutta. British shipments were reduced from 39 to 7, American from 18 to 2, and Swiss from 2 to ¼ lakhs. Imports from Germany increased from 34 to 39 lakhs.

THE PHENOL SITUATION in the United States is said to be causing alarm among consumers, particularly makers of salicylic acid and salicylates. Apparently it is becoming increasingly difficult to meet the demand from domestic sources and it is rumoured that the reopening of some of the domestic synthetic phenol plants is being contemplated.

THE QUANTITY of German goods received into the United Kingdom is still on the decrease, the July total being £113,200 less in value than the total for the preceding month. The July figures show an increase of £1,470 under the heading of scientific instruments. Imports of glass and glassware were £12,269 less and those of dyes and dyestuffs, £7,624 smaller.

CHILEAN NEWSPAPERS are said to be demanding that the Government should prevent the admission of German merchandise into Chile if Germany persists in restricting the importation of nitrate. A group of Chilean deputies is said to have decided to introduce a Bill with the object of securing the prohibition of the importation of goods from countries which do not permit the admission of Chilean nitrate without restrictions.

H.R.H. THE PRINCE OF WALES, who is Patron of the Ramsay Memorial Fund, has consented to unveil, on Friday, November 3, at 12 noon, the memorial tablet of the late Professor Sir William Ramsay which is being placed in Westminster Abbey. The tablet, which has been executed by Mr. Charles L. Hartwell, A.R.A., was exhibited at the Royal Academy this summer. Invitations will be sent out in October. Any communications with respect to the unveiling should be addressed to the Organising Secretary of the Ramsay Memorial Fund, Dr. Walter W. Seton, at University College, Gower Street, London, W.C.1.

A DAILY CONTEMPORARY has just discovered a well at Vange, near Pitsea, Essex, the water from which is claimed to possess remarkable curative properties. It will be recalled that an analysis of Vange water by Dr. S. Rideal was published in THE CHEMICAL AGE last March. The analysis gave the following results (parts per 100,000):—Magnesia, 203·8; lime, 62·2; soda, 69·4; potash, 14·2; manganese oxide, ·011; sulphuric anhydride, 527·7; chlorine, 43·5; carbonic acid, 23·8; silica, 2·65. The water contains no arsenic, lead, tin, or other poisonous metals, and nitrates and nitrites are absent. It contains free ammonia, ·0412 parts; albuminoid ammonia, ·0156 parts; the oxygen consumed being ·156 parts.

INCREASING COSTS and reduced production of synthetic nitrogen products in Germany have resulted in active negotiations in Berlin for the sale of Chilean nitrate to Germany for next season, and an announcement has now been made that the German Government have sanctioned the import of 200,000 tons of Chilean nitrate up to May 31, 1923, the sale of which will be controlled by the Hamburg Nitrate of Soda Importers' Corporation. The German Government have furthermore consented to the free import of unlimited quantities for consignment, which must not, however, be sold until after the disposal of the first 200,000 tons. To what extent this will result in the purchase by German consumers next spring cannot yet be estimated, state Aikman (London), Ltd., in a circular issued on Tuesday, as the difficulties of finance, owing to the low value of the mark, are still there, but it would appear that official circles in Germany are hopeful that this difficulty can be overcome.

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Abstracts of Complete Specifications

183,882. Cellulose Derivatives, Manufacture of. H. Dreyfus, 8, Waterloo Place, London, S.W.1. Application date, February 9, 1921.

In the usual process for manufacturing viscose, cellulose or a conversion product such as hydro-cellulose, oxycellulose and sulphite cellulose, is treated with caustic soda and then with carbon disulphide. The cellulose xanthogenate obtained is subjected to prolonged "ripening" before conversion into artificial silk and the like, and the object is to avoid the "ripening" and subsequent loss of some of the combined carbon disulphide. The caustic soda is employed in the proportion of about 1 molecule to each molecule of cellulose, and the carbon disulphide in a proportion not exceeding half this amount. These are less than the usual proportions, and a high molecular viscose is obtained in which a molecule of carbon disulphide is combined on to several molecules of cellulose. The caustic soda employed in the process is preferably about 20 to 50 per cent. strength, and the alkali cellulose may be subjected to the action of the carbon disulphide in an organic solvent or diluent such as benzol, which may afterwards be removed. The viscose obtained is soluble in water and alkali, and the solutions may be directly used for spinning without "ripening."

183,897. Organic Acids, Process of Converting into Esters. P. Haddan, London. From E. Zollinger-Jenny, Bellariastrasse 57, Zurich, Switzerland. Application date, April 4, 1921.

The process is for converting organic acids other than poly-oxy-fatty acids into esters by the use of zinc or tin or other metal of the periodic group including tin as a catalyst. The metal need not be in a finely divided condition, and the free fatty acid is rapidly neutralised on heating. The alcoholic component need not be in excess, but the mixture may be in stoichiometrical proportions. In an example a mixture of glycerine, copra oil waste, and copra fat acids, is heated in the presence of tin to 230° C. for one hour in the presence of carbon dioxide, and then for two hours at a reduced pressure. The fat is then neutralised with 1 per cent. of soda lye and bleached with fullers earth.

183,908. Cellulose Compounds, Process for the Manufacture of. Plauson's (Parent) Co., Ltd., 17, Waterloo Place, Pall Mall, London, S.W.1. From H. Plauson, 14, Huxter, Hamburg, Germany. Application date, April 28, 1921.

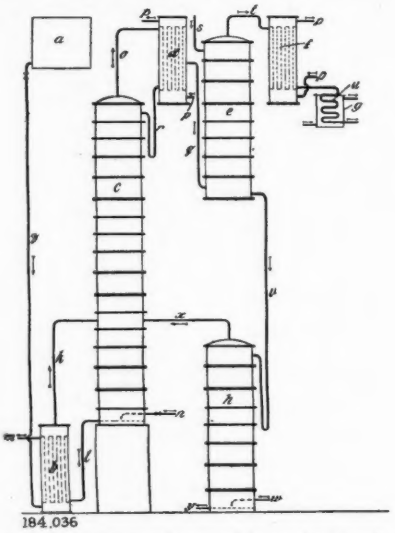
In the manufacture of cellulose compounds such as nitrates, acetates, or xanthogenates, by the action of acids on cellulose, the cellulose employed is rendered highly active by subjecting it to intensive mechanical disintegration in a colloid mill such as that described in Specification No. 179,124 (see The Chemical Age, vol. vi., p. 743). Examples are given of the production of a cellulose ester with *o*-phosphoric acid, acetic acid, and sulphur. In another example the dispersed cellulose is treated with methyl alcohol and then with hydrochloric acid, yielding the methyl ether. The cellulose material prepared by dispersion in this way is in gel form and is very highly active, the particles being only about 0·8 μ in diameter.

183,972. Casein, Plastic Material Made from. R. H. Abery, 163, Replingham Road, Southfields, London, S.W.18. Application date, May 30, 1921.

A solution of zinc sulphite 1 part, potassium or sodium meta-bisulphite 12 parts, glacial acetic acid 8 parts, and alcohol 4 parts, is treated with zinc cuttings until all action ceases, and the solution is then treated with milk of lime and filtered to remove the zinc. Another solution is made by dissolving casein in a solution of sodium or potassium carbonate, borax, sodium silicate, or ammonia, and the two solutions are mixed to precipitate the casein. The plastic material may be worked up as required and is hardened in a solution of formaldehyde.

184,036 and 184,129. Alcohol, Dehydration of. J. van Ruymbeke, Les Tamaris Vielle-Chapelle, Marseilles, France. Application dates, July 15, 1921, and March 22, 1922.

184,036.—The apparatus is for obtaining alcohol of a strength 98–99 per cent. by distillation or rectification. This result is obtained by bringing the alcohol vapour into contact with glycerine, which acts as a dehydrating agent. The process may be carried out in a separate plant starting from the 92–93 per cent. alcohol obtained by the usual rectifying process, or the final concentration plant may form part of the rectifying plant as shown in the illustration. Weak alcohol liquor passes from a tank *a* through a pipe *z* to a heat exchanger *b*, and thence to a primary rectifying column *c* through a pipe *k*. The residual liquor is withdrawn from the rectifying column through a pipe *l*, and passes in counter current through the heat exchanger *b* to pre-heat the incoming liquor. The alcohol and water vapour are drawn off through the pipe *o* to the condenser *d* and the fractional condensate is returned to the rectifying column through the pipe *r*. The richer vapour passes through the pipe *q* to the base of the dehydrating column *e*. The condenser *d* is maintained at such a temperature that only sufficient vapour is condensed to keep the plates in the column at the necessary strength. Glycerine passes downwards through the column *e* from the pipe *s*, and the dehydrated alcohol vapour passes out through a pipe *t* to a condenser *f* and then through a water-cooled coil *u*. The glycerine containing the extracted water passes through a pipe *v* to the top of a column *h*, where it is subjected to steam distillation, and the recovered alcohol is fed to the column *c* through the pipe *x*. Glycerine diluted with water is drawn off through the pipe *y*.

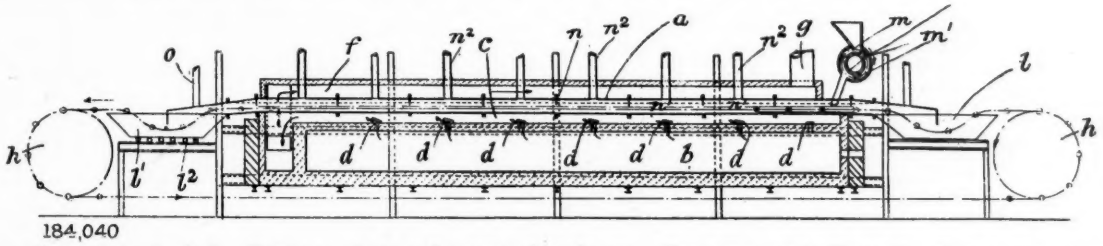


184,129 (addition to 184,036).—In the dehydration of alcohol by the process described in the Specification No. 184,036 above, it is found that a concentration of alcohol of 99·8 per cent. may be obtained by replacing the glycerine by a mixture of glycerine and an anhydrous salts or salts of a hygroscopic nature, such as calcium chloride, zinc chloride, potassium carbonate, etc. Such a solution is a more efficient dehydrating agent than pure glycerine. The glycerine may be regenerated by distilling off the alcohol by means of steam, and then concentrating the diluted solution by heating in vacuo to about 160° C.

184,040. Retorts or Furnaces. J. P. B. Webster, Pinners Hall, Austin Friars, London, E.C.2. Application date, July 20, 1921.

The retort is for the distillation of shale and the like, or for the roasting of ores. The retort *a* comprises a long open-

ended casing built up of a large number of sections of cast iron of rectangular section, bolted together. A combustion chamber *b* extends the whole length of the retort and contains gas burners. The hot gases pass through a number of dampers *d* into a flue *c* immediately below the retort, and each damper may be adjusted so as to provide a higher or lower temperature at various points of the retort throughout its length. A flue *c* is connected at one end to a flue *f* extended along the upper side of the retort to an outlet *g*. The material is conveyed through the retort on an endless series of flat trays or buckets which are supported on rollers running on tracks at each side of the retort. The trays are moved through the retort by



184,040

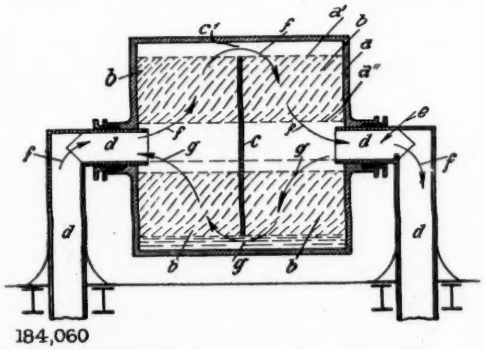
means of sprocket wheels *h*. Entrance of air and escape of gas are prevented at the ends of the retort by passing the conveyor through water seals *l*, *l*¹. The material is fed on to the conveyor from a hopper *m* through a rotary valve *p*. The vanes *m*¹ of the valve are of such a thickness that the material is not delivered on to the conveyor when the space between the trays is passing below the delivery conduit. The retort may be divided by diaphragms *n* into compartments, each of which is provided with a pipe *n*² leading to separate condensers. The temperature at the inlet end of the retort is maintained at about 200° C., increasing to about 500° C. at the outlet end. The position of the hopper *m* on the retort side of the water seal ensures the dryness of the material delivered to the retort.

184,057. Vertical Gas-fired Kilns for Burning Limestone or the like. C. F. Priest, 123, Albert Road, Middlesbrough, Yorks. Application date, August 3, 1921.

A vertical kiln is provided with an annular chamber surrounding it and having a number of delivery ports in the wall of the kiln at the burning zone. Combustible gas is supplied to the annular chamber, and its passage to each of the ports in the wall of the kiln is controlled by separate valves. The annular chamber is provided with dust-collecting recesses having valves for releasing accumulations of dust and tar. A hopper is provided at the bottom of the kiln for discharging the finished lime, and adjustable air inlets are provided in the hopper to control the supply of air for combustion. The limestone is supplied from a conical hopper above the kiln, and is preheated by the hot waste gases in descending to the burning zone. The burnt lime is cooled by the incoming air, which is thereby preheated.

184,060. Gas Washers. A. Florin, 14, Ruechlinstrasse, Berlin. Application date, August 9, 1921.

A horizontal drum *a* is supported on trunnions *d* and contains two inner perforated concentric cylinders *a'*, *a"*, which enclose an annular chamber filled with broken inert material.



184,060

A circular partition *c* is arranged in the centre of the casing, so that gas passing through the apparatus is compelled to follow the course indicated by the arrows *f*. The washing liquid is fed into the apparatus at the opposite end, and is distributed over the broken material by the rotation of the casing. The general direction of flow of the washing liquid is in counter current to the flow of gas, as indicated by the arrows *g*. The washing liquid fills approximately half the casing. In a modification, the washer may contain a series of partitions *c*, so that the gas passes alternately round the periphery of one partition and through a central opening in the next partition.

184,132. Pigments from Titanium Compounds contaminated with Sulphuric Acid, Process of Preparing. G. Carteret, 68, Rue Escudier, Boulogne-sur-Seine (Seine), France, and M. Devaux, 55, Rue de Rome, Paris. Application date, June 27, 1921.

To eliminate the sulphuric acid from amorphous titanium oxide, the oxide is treated with alkaline earth chloride, which precipitates alkaline earth sulphate. Free hydrochloric acid is produced, and is eliminated by saturating with milk of lime or baryta, followed by washing and drying the titanium oxide. The alkaline earth chloride solution thus obtained may be used again.

Note.—Abstracts of the following specifications which are now accepted appeared in The Chemical Age when they became open to inspection under the International Convention:—167,462–3 (N. Goslings), relating to the purification of oils and fats, see Vol. V., p. 436; 167,741 (Blei-und Silberhutte Braubach Akt.-Ges.), relating to the metallurgical treatment of materials containing precious metals, see Vol. V., p. 464; 171,391 (Stockholms Superfosfat Fabriks Aktiebolag), relating to manufacture of acetone from acetic acid, see Vol. VI., p. 48; 172,926 (P. W. Nevill and H. Soanes), relating to the extraction of copper from its ores, see Vol. VI., p. 209; 176,321 (C. Deguide), relating to a continuous process for manufacturing caustic soda or caustic potash, see Vol. VI., p. 602; 176,344 (F. Bayer and Co.), relating to a process for the manufacture of hyposulphites, see Vol. VI., p. 602.

International Specifications not yet Accepted

182,446. Aluminium Salicylate. Soc. Chimique des Usines du Rhône, 21, Rue Jean-Goujon, Paris. International Convention date, June 28, 1921.

Hydrated alumina is treated with a molecular proportion of salicylic acid to obtain aluminium salicylate having the composition $C_6H_4OHCO_2Al(OH)_2$. The product is filtered and then dried at 125°–130° C., or the mixture may be evaporated to dryness to remove the water.

182,459. Artificial Resins. Consortium für Elektrochemische Industrie Ges., 20, Zielstattstrasse, Munich, Germany. International Convention date, June 29, 1921.

Aldehydes are heated with alkali to produce artificial resins. If the resins are then dissolved in a solvent and precipitated by water, they are rendered stable towards water. The products are soluble in spirit, benzene, carbon tetrachloride, trichlorethylene, acetone, linseed oil, etc., and may be used for the production of varnishes or impregnating solutions. The final hardening of the resin may be effected by heating after precipitation in water. In an example a resin is produced by condensing acetaldehyde and alkaline lye, then dissolved in glacial acetic acid, and then precipitated as a powder by adding water. This product may be converted into a varnish or may be further heated to harden it. In

another example, crotonaldehyde and alkaline lye are condensed to form a viscous product which is dissolved in acetone and precipitated by water. The product is dissolved in linseed oil.

182,488. CELLULOSE ESTER SOLUTIONS. Nitrogen Corporation, 55, Canal Street, Providence, R.I., U.S.A. (Assignees of J. C. Clancy, Providence, R.I., U.S.A.) International Convention date, July 2, 1921.

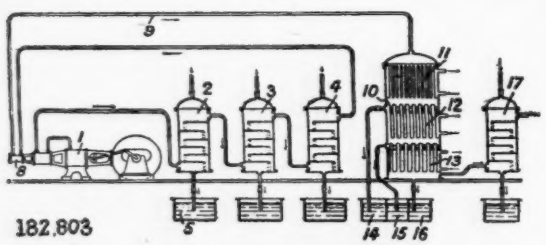
Cellulose esters such as the nitrate and acetate are dissolved in anhydrous liquid ammonia for use in the manufacture of artificial silk, films, etc. The ester is dissolved under pressure and the solvent subsequently recovered by evaporation under reduced pressure.

182,759. DYES. National Aniline and Chemical Co., Inc., 21, Burling Slip, Manhattan, New York. (Assignees of D. G. Rogers, 318, Linden Avenue, Buffalo, N.Y., U.S.A., and L. C. Daniels, 75, Northland Avenue, Buffalo, N.Y., U.S.A.) International Convention date, July 2, 1921.

The alkali fusion of benzanthrone is carried out with less alkali than usual, and in the presence of an inert solvent such as mineral or coal-tar oils (*e.g.*, kerosene) boiling above the reaction temperature, and a reducing agent such as dextrin, starch, cellulose, or other carbohydrates or aminophenols.

182,803. GAS MANUFACTURE. Ges. für Kohlentechnik, 26, Deutsche Strasse, Dortmund, Germany. International Convention date, July 7, 1921.

Coal gas is freed from tar and then compressed to about 20 atmospheres in a compressor 1 and fed to a series of washers 2, 3, 4. A counter-current of water at about 40° C. is passed through these washers, and ammonia, sulphuretted hydrogen and carbon dioxide are extracted, the ammoniacal solution being collected in a vessel 5. The gases then pass to the compressor 8 for compression to about 80 atmospheres, and



pass at a temperature of about 150° C. through a pipe 9 to a separator 10, where benzol is condensed in three stages 11, 12, 13, and the fractions are collected in the vessels 14, 15, 16. The gas finally passes to an oil washer 17. The temperature at which the ammonia, etc., is extracted is sufficiently high to prevent saturation of the gas with benzol, and the temperature of the benzol separator prevents separation of other hydrocarbons.

LATEST NOTIFICATIONS.

185,080. Apparatus for carburetting air with naphthalene. Brion, A. August 23, 1921.

185,107. Manufacture of resins resembling shellac. Consortium für Elektrochemische Industrie Ges. August 27, 1921.

185,124. Process for producing lead alloys containing strontium. Mathesius, W., and Mathesius, H. August 24, 1921.

185,126. Processes for denaturing alcohol and alcoholic preparations. Johansson, N. H. August 26, 1921.

Specifications Accepted, with Date of Application

165,071. Electrolytic cell. Elektrizitäts Akt.-Ges. vorm. Schuckert and Co. June 14, 1920.

165,082. Metallic electrolytic deposits easily detachable from the cathode, Process for obtaining. Soc. d'Electro-Chimie et d'Electro Metallurgie. June 18, 1920.

165,085. Acetaldehyde from acetylene, Process for the production of. Soc. Anon. de Produits Chimiques Etablissements Maletra. June 15, 1920. Addition to 140,784.

169,952. Dry distillation and coking of raw peat and the like, Process of. A. J. H. Haddan. (*Torfverwertungsges Dr. Pohl und von Dewitz.*) May 10, 1921. Addition to 158,513.

177,526. Stable dry and soluble vat preparations for dyeing, Manufacture of. Farbwerke vorm. Meister, Lucius, and Brüning. March 26, 1921. Addition to 171,078.

184,501. Ores, Process for treating. W. J. Mellersh-Jackson. (*Soc. Metalurgica Chilena "Cuprum."*) February 10, 1921.

184,507. Recovering by-products from distillate gases, Process and apparatus for. E. Barbet et Fils et Cie. February 11, 1920.

184,525. Carbonisation of coal, shale, peat, lignite and the like, Apparatus for. H. P. Hird. December 20, 1921.

184,527. Copper sulphate, Process and apparatus for crystallising. J. M. Dossett. March 31, 1921.

184,533. Viscose, Manufacture and treatment of. Plauson's (Parent Co.), Ltd. (*H. Plauson.*) April 11, 1921.

184,534. Oils or other organic substances, Manufacture of compositions of. Plauson's (Parent Co.), Ltd. (*H. Plauson.*) April 11, 1921.

184,610. Hydra-oxy-cellulose and a xanthogenated compound obtained therefrom and a solid compact material obtained by coagulation of the latter. C. C. L. G. Budde. May 28, 1921.

184,624. Tar, Distillation of. Thermal, Industrial, and Chemical (T.I.C.) Research Co., Ltd., J. S. Morgan, and D. Rider. June 7, 1921.

184,625. Dialkylamides of nicotinic acid, Manufacture of. O. Y. Imray. June 7, 1921.

184,627. Oxalic acid, Manufacture and production of. J. Y. Johnson. (*Badische Anilin and Soda Fabrik.*) June 7, 1921.

184,628. Argentiferous lead-zinc sulphide ores, Treatment of. F. E. Elmore and Chemical and Metallurgical Corporation, Ltd. June 8, 1921.

184,671. Cellulose derivatives, Manufacture of solutions, compositions, preparations or articles made with. H. Dreyfus. July 20, 1921.

Applications for Patents

Alexander, A. E. (United States Gasoline Manufacturing Corporation). Producing hydrocarbon compounds. 23289. August 28.

Atack, F. W., and Thompson, W. P. Manufacture of azines and hydroazines of the anthraquinone series. 23809. September 2.

Belton, F. W. J., and Dempster, Ltd., R. and J. Effluent valve for ammonia liquor, etc., plant. 23264. August 28.

British Dyestuffs Corporation, Ltd., Green, A. G., and Saunders, K. H. Methods of dyeing artificial silk, etc. 23543. August 30.

Calvert, G. Manufacture of substances containing a methyl radicle. 23571. August 30.

Carpmael, W. P., and Buckman, H. H. Titanium complexes, and method for producing same. 23427. August 29.

Dubuis, P. L. Method of manufacture of solvent for perfumery, oils, etc. 23693. September 1.

Engel, H., and Masson, R. D. Clarifying and refining crude oils. 23529. August 30.

Farbwerke vorm. Meister, Lucius, & Brüning. Manufacture of methane. 23561. August 30. (Germany, Oct. 4, 1921.)

Farbwerke vorm. Meister, Lucius, & Brüning. Manufacture of methane. 23674. August 31. (Germany, Oct. 4, 1921.)

Hackford, J. E. Manufacture of gas from oil, and utilisation of resulting gas. 23572. August 30.

Hansen, I. J. Moltke-. Method of treating containers, etc., of iron for manufacture of sodium peroxide. 23441. August 29.

Herrero, P. Process of purification of water. 23753. September 1.

Jacobson, B. H. Manufacture of anhydrous metal chlorides. 23473. August 30. (United States, May 31.)

Klipstein and Sons, Co., E. C., and Thompson, W. P. Process of manufacturing derivatives of carbazols. 23361. August 29.

Klipstein and Sons, Co., E. C., and Thompson, W. P. Manufacture of *p* dichlorbenzene. 23362. August 29.

Laing, B., and Neilsen, H. Distillation of carbonaceous, etc., materials. 23796. September 1.

Marks, E. C. R., and Parke Davis and Co. Compounds of silver iodide and protein substances. 23448. August 29.

Mathieson Alkali Works, Inc. Multi-tank cradles. 23659. August 31. (United States, September 22, 1921.)

Mathieson Alkali Works, Inc. Multiple-unit tank cars. 23672. August 31. (United States, February 7.)

Meade, A. Gasification of coal. 23398. August 29.

Perry, S. J., and W. P. Process for treating materials containing cellulose. 23295. August 28.

Plauson, H. Process for making oil colours and printers' inks. 23262. August 28.

Plauson, H. Treatment of cellulose, etc. 23808. September 2.

Rawson, W. S. Treatment of hydromagnesite. 23419. August 29.

Reynard, O., Tapping, F. F., and Thornley, F. C. Manufacture of cellulose. 23421. August 29.

Techno-Chemical Laboratories, Ltd. Turbines, etc. 23326. August 28.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

LONDON, SEPTEMBER 7, 1922.

THERE is little alteration in the markets this week, and business has on the whole been of moderate dimensions. The anticipated improvement in demand has not so far been realised, and the majority of orders are for small quantities.

Prices on the whole continue firm.

Export trade has been slightly better, with an improved demand in the Far East.

General Chemicals

ACETONE maintains its value at the higher level, and stocks are extremely light.

ACID ACETIC is extremely firm and again inclined to advance.

ACID CITRIC is only a poor market.

ACID FORMIC has been called for, and the price is firm.

ACID LACTIC is in good demand, and the price is firm.

ACID TARTARIC business has been on the quiet side, and the price is inclined to be easy.

BARIUM CHLORIDE is perhaps in a little better supply, but the price is well maintained.

COPPER SULPHATE is without feature, and only a small business is passing.

CREAM OF TARTAR has been in better request, especially on export account, and the price is maintained.

FORMALDEHYDE is higher, and the demand has slightly improved.

IRON SULPHATE passes slowly into consumption.

LEAD ACETATE continues firm, and sight supplies are small.

LEAD NITRATE is moderately active.

LITHOPONE is in small request at last quoted figures.

MAGNESIUM CHLORIDE.—There is little business to report, but the price is without change.

POTASSIUM CARBONATE has been in better demand, but the price continues weak.

POTASSIUM CAUSTIC has been called for, and the price is without change.

POTASSIUM CHLORATE maintains its price, and is in good request.

SODIUM HYPOSULPHITE is moderately active, and there are lower offers from the Continent.

SODIUM NITRITE is idle, and the price is inclined to be weaker.

SODIUM PHOSPHATE is weak, with little business passing.

SODIUM PRUSSIATE is in good demand, and near supplies are scarce.

WHITE LEAD is in good request.

ZINC OXIDE has not been so active, but the price is maintained.

Coal Tar Intermediates

Business continues on quiet lines, but more interest is about, and certain prices show a slight upward tendency.

ALPHA NAPHTHOL is firm and steady.

ALPHA NAPHTHYLAMINE is without change on previous quotations, with a small regular consumption going on.

ANILINE SALT is firm, with export business in the market.

ANILINE OIL is in demand on home account.

BENZIDINE BASE is quiet on home account, but a fair Continental inquiry has been received.

BETA NAPHTHOL is without special feature.

DIANISIDINE has been inquired for.

DIPHENYLAMINE is very firm, with small available stocks.

"G" ACID is in demand on home account.

"H" ACID is inquired for on home account.

NAPHTHIONIC ACID is a small regular business.

NITRO BENZOL is in good demand for home consumption, but the price remains unchanged.

ORTHO NITRO TOLUOL is in demand by home manufacturers.

PARANITRANILINE.—A few export inquiries.

PARAPHENYLENEDIAMINE is in steady firm demand.

"R" SALT.—Both home and export business in the market.

RESORCIN is steady.

Coal Tar Products

There is no change in this market from last week, and the demand for most coal tar products is fairly steady. The threatened imposition of a heavy American tariff has somewhat upset the carbolic market for the moment.

90's BENZOL is in good demand, and is worth 2s. 1d. to 2s. 2d. per gallon on rails.

PURE BENZOL is in poor demand, and is worth about 2s. 4d. to 2s. 5d. per gallon on rails.

CREOSOTE OIL is more plentiful, although the same irregularity in prices is apparent. Quotations range from 5½d. to 6¾d. per gallon on rails in the Midlands and North, and 6½d. to 7¼d. in the South.

CRESYLIC ACID is scarce for prompt delivery, and is worth 2s. 6d. per gallon on rails for September delivery. October/December is not worth more than 2s. 4d. however. These prices are for the pale quality 97/99%. The dark quality is worth about 2s. 1d. on rails for September, and 2s. for October/December.

SOLVENT NAPHTHA maintains a fairly steady tone without very much new business doing, and is worth about 1s. 8½d. to 1s. 9d. per gallon on rails.

HEAVY NAPHTHA is somewhat slow, and is quoted at 1s. 7d. per gallon on rails.

NAPHTHALENE is weak with a poor inquiry.

PITCH remains firm. To-day's quotations are 87s. 6d. to 90s. f.o.b. London; 85s. to 87s. 6d. f.o.b. East Coast.

Sulphate of Ammonia

The position is unchanged.

Current Prices

Chemicals

	Per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	1	8	to	0	1	10
Acetone oil	ton	80	0	0	to	82	10	0
Acetone, pure	ton	85	10	0	to	87	10	0
Acid, Acetic, glacial, 99–100%	ton	67	0	0	to	68	0	0
Acetic, 80% pure	ton	47	0	0	to	48	0	0
Arsenic, liquid, 2000 s.g.	ton	67	0	0	to	70	0	0
Boric, cryst.	ton	60	0	0	to	65	0	0
Carbolic, cryst. 39–40%	lb.	0	0	6	to	0	0	6½
Citric	lb.	0	2	3	to	0	2	4
Formic, 80%	ton	65	0	0	to	66	0	0
Gallic, pure	lb.	0	2	11	to	0	3	0
Hydrofluoric	lb.	0	0	7½	to	0	0	8½
Lactic, 50 vol.	ton	40	0	0	to	43	0	0
Lactic, 60 vol.	ton	43	0	0	to	45	0	0
Nitric, 80 Tw.	ton	30	0	0	to	31	0	0
Oxalic	lb.	0	0	7¾	to	0	0	8
Phosphoric, 1.5	ton	38	0	0	to	40	0	0
Pyrogallic, cryst.	lb.	0	6	0	to	0	6	3
Salicylic, Technical	lb.	0	0	10½	to	0	1	0
Salicylic, B.P.	lb.	0	1	5	to	0	1	6
Sulphuric, 92–93%	ton	7	10	0	to	8	0	0
Tannic, commercial	lb.	0	2	3	to	0	2	9
Tartaric	lb.	0	1	4½	to	0	1	5
Alum, lump	ton	10	0	0	to	10	10	0
Alum, chrome	ton	28	0	0	to	29	0	0
Alumino ferric	ton	9	0	0	to	9	5	0
Aluminium, sulphate, 14–15%	ton	10	10	0	to	11	0	0
Aluminium, sulphate, 17–18%	ton	11	10	0	to	12	0	0
Ammonia, anhydrous	lb.	0	1	8	to	0	1	9
Ammonia, .880	ton	33	0	0	to	35	0	0
Ammonia, .920	ton	21	0	0	to	23	0	0
Ammonia, carbonate	lb.	0	0	4	to	0	0	4½
Ammonia, chloride	ton	60	0	0	to	65	0	0
Ammonia, muriate (galvanisers)	ton	35	0	0	to	37	10	0
Ammonia, nitrate (pure)	ton	35	0	0	to	40	0	0
Ammonia, phosphate	ton	74	0	0	to	75	0	0
Ammonia, sulphocyanide	lb.	0	1	10	to	0	2	0
Amyl acetate	ton	175	0	0	to	185	0	0
Arsenic, white, powdered	ton	42	0	0	to	44	0	0
Barium, carbonate, 92–94%	ton	12	10	0	to	13	0	0
Barium, Chlorate	ton	60	0	0	to	68	0	0

	Per	£	s.	d.		£	s.	d.
Barium Chloride	ton	23	0	0	to	23	10	0
Nitrate	ton	27	10	0	to	30	0	0
Sulphate, blanc fixe, dry	ton	20	10	0	to	21	0	0
Sulphate, blanc fixe, pulp	ton	10	5	0	to	10	10	0
Sulphocyanide, 95%	lb.	0	1	0	to	0	1	3
Bleaching powder, 35–37%	ton	12	0	0	to		—	
Borax crystals	ton	29	0	0	to	33	0	0
Caffein	lb.	0	13	0	to	0	14	0
Calcium acetate, Brown	ton	9	10	0	to	10	10	0
,, ,, Grey	ton	14	10	0	to	15	0	0
Calcium Carbide	ton	16	0	0	to	17	0	0
Chloride	ton	6	10	0	to		—	
Carbon bisulphide	ton	50	0	0	to	52	0	0
Casein, technical	ton	47	0	0	to	55	0	0
Cerium oxalate	lb.	0	4	6	to	0	4	9
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	6	0	to	0	6	6
Oxide, black	lb.	0	9	6	to	0	10	0
Copper chloride	lb.	0	1	2	to	0	1	3
Sulphate	ton	26	10	0	to	27	0	0
Cream Tartar, 98–100%	ton	108	0	0	to	110	10	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde, 40% vol.	ton	68	10	0	to	70	0	0
Formusol (Rongalite)	lb.	0	2	6	to	0	2	9
Glauber salts, commercial	ton	5	0	0	to	5	10	0
Glycerine, crude	ton	65	0	0	to	67	10	0
Hydrogen peroxide, 12 vols.	gal.	0	2	5	to	0	2	6
Iron perchloride	ton	30	0	0	to	32	0	0
Iron sulphate (Copperas)	ton	4	0	0	to	4	5	0
Lead acetate, white	ton	41	0	0	to	42	0	0
Carbonate (White Lead)	ton	43	0	0	to	47	0	0
Nitrate	ton	46	10	0	to	48	10	0
Litharge	ton	35	10	0	to	36	0	0
Lithopone, 30%	ton	23	10	0	to	24	0	0
Magnesium chloride	ton	7	0	0	to	7	10	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	8	0	0	to	8	10	0
Sulphate (Druggists')	ton	13	10	0	to	14	10	0
Manganese, Borate, commercial	ton	65	0	0	to	75	0	0
Sulphate	ton	60	0	0	to	62	0	0
Methyl acetone	ton	70	0	0	to	75	0	0
Alcohol, 1% acetone	ton	70	10	0	to	75	0	0
Nickel sulphate, single salt	ton	49	0	0	to	51	0	0
Ammonium sulphate, double salt	ton	51	0	0	to	52	0	0
Potash, Caustic	ton	33	0	0	to	34	0	0
Potassium bichromate	lb.	0	0	6¼	to		—	
Carbonate, 90%	ton	31	0	0	to	33	0	0
Chloride, 80%	ton	12	0	0	to	12	10	0
Chlorate	lb.	0	0	4½	to	0	0	5
Metabisulphite, 50–52%	ton	84	0	0	to	90	0	0
Nitrate, refined	ton	45	0	0	to	47	0	0
Permanganate	lb.	0	0	9	to	0	0	10
Prussiate, red	lb.	0	4	6	to	0	4	9
Prussiate, yellow	lb.	0	1	7½	to	0	1	8½
Sulphate, 90%	ton	13	0	0	to	13	10	0
Salammoniac, firsts	cwt.	3	3	0	to		—	
Seconds	cwt.	3	0	0	to		—	
Sodium acetate	ton	24	10	0	to	24	15	0
Arseniate, 45%	ton	45	0	0	to	48	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	5	to		—	
Bisulphite, 60–62%	ton	23	0	0	to	24	0	0
Chlorate	lb.	0	0	3¾	to	0	0	4
Caustic, 70%	ton	20	10	0	to	21	0	0
Caustic, 76%	ton	21	10	0	to	22	10	0
Hydrosulphite, powder, 85%	lb.	0	1	9	to	0	2	0
Hyposulphite, commercial	ton	12	10	0	to	13	10	0
Nitrite, 96–98%	ton	31	0	0	to	32	0	0
Phosphate, crystal	ton	16	10	0	to	17	0	0
Perborate	lb.	0	0	11	to	0	1	0
Prussiate	lb.	0	0	11	to	0	0	11½
Sulphide, crystals	ton	12	10	0	to	13	10	0
Sulphide, solid, 60–62%	ton	21	10	0	to	23	10	0
Sulphite, cryst.	ton	12	10	0	to	13	0	0
Strontium carbonate	ton	55	0	0	to	60	0	0
Strontium Nitrate	ton	50	0	0	to	55	0	0
Strontium Sulphate, white	ton	6	10	0	to	7	10	0
Sulphur chloride	ton	25	0	0	to	27	10	0
Sulphur, Flowers	ton	13	0	0	to	14	0	0
Roll	ton	13	0	0	to	14	0	0
Tartar emetic	lb.	0	1	6	to	0	1	7
Theobromine	lb.	0	14	0	to	0	14	6
Tin perchloride, 33%	lb.	0	1	2	to	0	1	4
Perchloride, solid	lb.	0	1	5	to	0	1	7
Protochloride (tin crystals)	lb.	0	1	5	to	0	1	6

	Per	£	s.	d.		£	s.	d.
Zinc chloride 102° Tw.	ton	21	0	0	to	22	10	0
Chloride, solid, 96–98%	ton	25	0	0	to	30	0	0
Oxide, 99%	ton	36	0	0	to	38	0	0
Dust, 90%	ton	45	0	0	to	47	10	0
Sulphate	ton	18	10	0	to	19	10	0

Coal Tar Intermediates, &c.

	Per	£	s.	d.		£	s.	d.
Alphanaphthol, crude	lb.	0	2	3	to	0	2	6
Alphanaphthol, refined	lb.	0	3	0	to	0	3	3
Alphanaphthylamine	lb.	0	2	0	to	0	2	1
Aniline oil, drums extra	lb.	0	1	0	to	0	1	1
Aniline salts	lb.	0	1	0	to	0	1	1
Anthracene, 40–50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	3	6	to	0	3	9
Benzidine, base	lb.	0	5	3	to	0	5	6
Benzidine, sulphate	lb.	0	5	3	to	0	5	6
Benzoic acid	lb.	0	1	9	to	0	2	0
Benzoate of soda	lb.	0	1	7½	to	0	1	9
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate	lb.	0	4	9	to	0	5	0
Betanaphthol	lb.	0	1	4	to	0	1	4½
Betanaphthylamine, technical	lb.	0	5	0	to	0	5	6
Croceine Acid, 100% basis	lb.	0	3	6	to	0	3	9
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	2	9	to	0	3	0
Dinitrobenzol	lb.	0	1	3	to	0	1	4
Dinitrochlorbenzol	lb.	0	0	11	to	0	1	0
Dinitronaphthalene	lb.	0	1	4	to	0	1	5
Dinitrotoluol	lb.	0	1	5	to	0	1	6
Dinitrophenol	lb.	0	1	9	to	0	2	0
Dimethylaniline	lb.	0	2	6	to	0	2	9
Diphenylamine	lb.	0	4	3	to	0	4	6
H-Acid	lb.	0	6	3	to	0	6	9
Metaphenylenediamine	lb.	0	4	9	to	0	5	3
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	6	0	to	0	6	6½
Metatoluylenediamine	lb.	0	4	6	to	0	4	9
Monosulphonic Acid (2.7)	lb.	0	5	6	to	0	6	0
Naphthionic acid, crude	lb.	0	3	0	to	0	3	3
Naphthionate of Soda	lb.	0	3	0	to	0	3	3
Naphthylamin-di-sulphonic-acid	lb.	0	4	0	to	0	4	3
Neville Winther Acid	lb.	0	7	9	to	0	8	0
Nitrobenzol	lb.	0	0	9	to	0	0	9½
Nitronaphthalene	lb.	0	1	3	to	0	1	4
Nitrotoluol	lb.	0	1	0	to	0	1	2
Orthoamidophenol, base	lb.	0	12	0	to	0	12	6
Orthodichlorbenzol	lb.	0	1	0	to	0	1	1
Orthotoluidine	lb.	0	1	6	to	0	1	9
Orthonitrotoluol	lb.	0	0	8	to	0	0	10
Para-amidophenol, base	lb.	0	9	0	to	0	9	6
Para-amidophenol, hydrochlor	lb.	0	8	6	to	0	9	0
Paradichlorbenzol	lb.	0	0	6	to	0	0	7
Paranitraniline	lb.	0	3	6	to	0	3	9
Paranitrophenol	lb.	0	2	3	to	0	2	6
Paranitrotoluol	lb.	0	5	0	to	0	5	3
Paraphenylenediamine, distilled	lb.	0	10	6	to	0	10	9
Paratoluidine	lb.	0	6	0	to	0	6	6
Phthalic anhydride	lb.	0	2	9	to	0	3	0
Resorcin, technical	lb.	0	4	6	to	0	5	0
Resorcin, pure	lb.	0	7	0	to	0	7	3
Salol	lb.	0	2	0	to	0	2	3
Sulphanilic acid, crude	lb.	0	1	0	to	0	1	1
Tolidine, base	lb.	0	6	6	to	0	7	0
Tolidine, mixture	lb.	0	2	6	to	0	2	9

Recovery of Austrian Debts

UNDER the powers conferred upon him by Article 1 (XIV.) of the Treaty of Peace (Austria) Orders, 1920–22, and with the approval of the President of the Board of Trade, the Administrator of Austrian Property has prescribed December 30 next as the final date by which proofs by British nationals of debts due to them by Austrian nationals, or of pecuniary obligations of the Austrian Government under Article 248 of the Treaty of St. Germain-en-Laye, and other claims by British nationals against the Austrian Government, must be made in order to rank for payment of the first dividend to be declared by him out of the Austrian assets within His Majesty's Dominions or Protectorates which are subject to the charge created by Article 1 (IX.) of those Orders. The prescribed forms of proof of claim may be obtained on application to the Administrator of Austrian Property at Cornwall House, Stamford Street, London, S.E.1.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

GLASGOW, SEPTEMBER 6, 1922.

BUSINESS during the past week has been quiet, and prices generally have shown little change.

Continental quotations are inclined to be easier for some material, and there is at present considerable difficulty in getting prompt shipment.

Industrial Chemicals

ACID ACETIC.—Moderate inquiry. Glacial, 98/100%, £55 to £57 per ton; 80%, pure, £44 per ton; 80% technical, £39 per ton.

ACID BORACIC.—No change in price; crystal or granulated, £60 per ton; powdered, £62 per ton.

ACID CARBOLIC, CRYSTALS.—Quoted 6d. per lb.

ACID HYDROCHLORIC.—Makers' price unchanged, 6s. 6d. per carboy ex works.

ACID OXALIC.—Unchanged at about 7¾d. per lb.

ACID SULPHURIC.—Makers' price unchanged; 144°, £4 per ton; 168°, £7 5s. per ton; de-arsenicated, £1 per ton more.

ACID TARTARIC.—Offered for spot delivery at 1s. 3d. per lb.

ALUM, LUMP POTASH.—Moderate inquiry. Price about £15 per ton ex station.

ALUMINA SULPHATE.—Continental make slightly dearer 14-15 per cent., £7 10s.; 17-18 per cent., £9 15s., c.i.f. U.K. port.

AMMONIA CARBONATE.—Price unchanged. Lump, 4d. per lb.; powdered, 4½ per lb., delivered.

AMMONIA LIQUID, 880°.—Quoted at 3d. per lb. ex works.

AMMONIA MURIATE.—Galvanisers' grey, £35 to £36 per ton; fine white crystals quoted £26 per ton, c.i.f. U.K.

AMMONIA SULPHATE.—25¼%, £14 15s.; 25¾%, £15 18s. per ton, ex works, September-October.

ARSENIC, WHITE POWDERED.—Price firm at £45 per ton ex quay.

BARIUM CHLORIDE.—Continental offers of £20 15s. per ton, c.i.f. U.K.

BARYTES.—Finest English white unchanged at £5 5s. per ton ex works.

BLEACHING POWDER.—Price £12 15s. ex station.

BORAX.—No change in price. Crystal or granulated, £29 per ton; powdered, £30 per ton.

CALCIUM CHLORIDE.—English make, £6 per ton ex quay. Continental offers of £4 15s. per ton c.i.f. U.K.

COPPER SULPHATE.—Price about £26 to £27 per ton ex quay.

COPPERAS, GREEN.—Unchanged at about £3 15s. to £4 per ton.

FORMALDEHYDE, 40%.—Price for spot delivery about £67 to £68 per ton; quoted £60 per ton c.i.f. U.K.

GLAUBER SALTS.—Quoted £4 to £5 per ton according to quality.

LEAD.—Red, £37 15s. per ton delivered; white, £49 15s. per ton delivered. Continental red lead offered at £36 10s. per ton ex store.

MAGNESITE.—Moderate inquiry. Finest Greek calcined, £12 per ton; synthetic calcined, £9 per ton ex store.

MAGNESIUM CHLORIDE.—Continental offers of £4 12s. 6d. c.i.f.; spot lots, £6 5s. per ton ex store.

MAGNESIUM SULPHATE (EPSOM SALTS).—Commercial, £7 5s. per ton; B.P., £9 10s. per ton.

POTASSIUM BICHROMATE.—Price unchanged, 6¼d. per lb.

POTASSIUM CARBONATE.—Moderate inquiry; 80/85%, £25/26 per ton; 90/92%, £28/29 per ton; 96/98%, £32/33 per ton.

POTASSIUM CAUSTIC.—88/92%.—Price about £30/31 per ton spot delivery.

POTASSIUM CHLORATE.—Price now about 4¼d. per lb.

POTASSIUM NITRATE (SALTPETRE).—Unchanged at about £33 per ton ex store.

POTASSIUM PRUSSIATE, YELLOW.—1s. 7½d. to 1s. 8½d. per lb. asked for spot delivery.

SODIUM BICARBONATE.—Refined re-crystallised, £10 10s. per ton ex quay or station; m.w. quality, £9 10s.

SODIUM BICHROMATE.—Unchanged at 5d. per lb.

SODIUM CARBONATE.—Soda Crystals, £5 10s. to £5 15s. per ton ex quay or station. Alkali, Spot lots, £9 1s. 6d. ex quay.

SODIUM CAUSTIC.—Prices unchanged. 76/77%, £23 5s.; 70/72%, £21 5s.; 60% broken, £24; powdered, 98/99%, £26 15s. to £27 15s.; bottoms, £14 per ton ex station.

SODIUM HYPOSULPHITE.—Commercial, £13 per ton; pea crystals, about £19 per ton ex station.

SODIUM NITRATE.—Quoted £14 per ton f.o.r. or f.o.b.; refined quality, 5s. per ton more.

SODIUM PRUSSIATE (YELLOW).—Unchanged at about 11½d. per lb.

SODIUM SILICATE, 140°.—Quoted £11 per ton f.o.b.

SODIUM SULPHATE (SALTCAKE 95%).—Price unchanged at £4 per ton delivered.

SODIUM SULPHIDE, 60/62% CONC.—On offer at £16 per ton, c.i.f. U.K.; 30/32% Crystals, on offer at £8 per ton c.i.f. U.K.

SULPHUR.—Surplus Government stocks of Sicilian thirds, £4 5s. to £4 15s. per ton; flowers, £13; roll, £12; rock, £12; ground, £11. Prices nominal. Moderate inquiry for rock.

TIN CRYSTALS.—Price unchanged at 1s. 2d. per lb.

ZINC CHLORIDE.—Offered at £22 per ton ex wharf.

NOTE.—The above prices are for bulk and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

BINITROTOLUOL.—Export inquiry. Price quoted 1s. 5½d. lb. f.o.b.

BETANAPHTHOL.—Price firm at about 1s. 3d. per lb.

BENZIDINE BASE.—Export inquiry. Price quoted 6s. 6d. per lb. f.o.b. U.K. port.

DIANISIDINE HYDROCHLORIDE.—Home inquiry. Supplies offered at 20s. per lb. on 100% basis.

DIMETHYLANILINE.—Home inquiry. Price 2s. 6d. to 2s. 7d. per lb. delivered. Drums returnable.

MONOCHLORBENZOL.—Home inquiries. Offered at £65 per ton carriage paid. Returnable drums.

NITROBENZOL.—Export inquiry. Price quoted 10d. per lb. f.o.b. drums included.

NAPHTHIONIC ACID.—Home inquiry. Price quoted 2s. 11d. per lb. on 100% basis.

"R" SALT.—Home inquiry. Price quoted 3s. 4½d. per lb. on 100% basis.

SALICYLIC ACID, B.P.—Home inquiries. Price, 1s. 5d. per lb. delivered.

SULPHANILIC ACID.—Supplies offered at 1s. 6d. per lb. on 100% basis.

The Institution of Rubber Industry

AFTER a very successful inaugural session last year the Institution of Rubber Industry has arranged an interesting programme for the coming winter. The first lecture on "Rubber Latex in Paper Making," by Frederick Kaye, A.R.C.Sc., was given on Monday at the Engineers' Club, London, and the other papers arranged to be read before the London Section are as follow: "Rubber as it Applies to Aircraft," by J. W. W. Dyer (October 2); "Recent Developments of the Plantation Industry," by Dr. H. P. Stevens (November 6); "Propaganda in the Rubber Industry," by G. R. Crowther (December 4); "Plantation Rubber," by P. J. Burgess (January 8, 1923); "Technology in the Rubber Industry," by W. A. Williams, F.I.C. (February 5); Telegraph Cable Manufacture, Rubber and Gutta Percha," by H. Savage (March 5); Rubber Pigments," by Dr. D. F. Twiss (April 9); and "The Use of Rubber Products as Dielectrics," by W. S. Flight (May 7). The Manchester programme includes: "Reclaimed Rubber," by Dr. J. Torrey (September 18); "Oil Burning for Raising Steam," particularly in relation to the Rubber Industry," by A. F. Baillie (November 20); "Patents as they affect the Rubber Industry," by H. E. Potts, M.Sc. (January 22); "A Review of all Solvent Recovery Processes," by J. H. Wild (February 19); and "The Scope and Progress of the Research Association," by B. D. Porritt, M.Sc., F.I.C. Dr. P. Schidrowitz has arranged to read a paper on April 23 next, but the subject has not yet been fixed.

German Chemical Trade Notes

FROM OUR OWN CORRESPONDENT.

Berlin, September 4, 1922.

IN contrast to the conditions which have been obtaining during the past few weeks, offerings on the chemical market are now in excess of the demand, but consumers show little inclination towards heavier buying.

As from September 1 the Reichskalirat has raised the price of potash by a further 102 per cent. The last increase, of 30 per cent., took effect from August 8.

New prices for nitrogenous fertilisers also came into force on September 1, the prices per kilogram nitrogen being as follows:—Ammonia, sulphate, ordinary quality, 242.20 mk.; dried and ground, 247.90 mk.; ammonia muriate, 242.20 mk. Works' stocks of these fertilisers are said to be extremely low.

Satisfactory dividends continue to be paid by German chemical manufacturers. The Thueringer Bleiweissfabriken A.G. (vorm. Anton. Greiner Witwe u. Max Bucholz) is again paying 32 per cent., and the Stassfurter Chemische Fabrik. A.G., which paid a dividend of 30 per cent. last year, will probably make an even larger distribution. The profit on the first year's working of the Chemische Fabrik Siegfried Kroch A.G. was 543,966 mk., and a dividend of 20 per cent. is being paid.

The following quotations are given in marks per kilogram, unless otherwise stated (d=domestic price; e=export price):—

ACIDS: Acetic, 80%, 140 mk. d.; £48 per ton e.; tendency firm. Glacial, 98/100%, in brisk demand at 155 mk. d.; £53 per ton e. Acetyl-Salicylic, 750/800 mk. d.; 1,400/1,500 mk. e. Benzoic, very scarce at 400/450 mk. d. Boric, 476 mk. d. Citric, 1,650 mk. d.; 1,600 mk. e.; tendency firm, with short supplies. Formic, 85%, 95 mk. d. Oxalic, 98/100%, white, crystallised, 150/160 mk. d.; 350 mk. e. Salicylic, 475 mk. d. Tartaric, factory, prices advanced: crystallised and powdered goods in good demand at 800/850 mk. d.; 1,000 mk. e.

INDUSTRIAL CHEMICALS: Alum: Potash, crystal powder, 30 mk. d.; 35/40 mk. e.; chrome, 15%, 130 mk. d. Ammonia Carbonate, powdered, in brisk demand, at 55 mk. d.; 175 mk. e.; in lumps, 31 per ton e. Arsenic, white, £50 per ton e. Bleaching Powder, 22 mk. d.; 40 mk. e. Borax, crystallised, 220/230 mk. d. Benzaldehyde, 550 mk. d.; 600 mk. e. Calcium Chloride, 18.50 mk. d.; 22 mk. e. Copper Sulphate, 98/100%, £26 10s. e. per ton. Copperas, 11 mk. d.; 17 mk. e. Cream of Tartar, 98/100% neglected at 380 mk. d. Dextrine, in brisk demand, but very scarce, A1 quality, 100 mk. d. Epsom Salt, 9.50 mk. d.; 13 mk. e. Formaldehyde, 40%, 260 mk. e.; 30%, 150/160 mk. d. Glauber's Salt, crystallised, technical, 8 mk. d.; 18 mk. e. Lead, red, 185 mk. d. Sugar of Lead, £36 per ton e. Litharge, 185/210 mk. d. Lithopone, 80/100 mk. d.; £19 per ton e. Magnesium Chloride, 9 mk. d.; 24 mk. e. Naphthalene, in flakes, 50 mk. d.; 75 mk. e. Potassium Bichromate, 300 mk. d.; £26 per ton e. Potash Caustic, 88/92%, 90 mk. d.; 160 mk. e.; liquor, 29 mk. d. Potassium Carbonate, 96/98%, 84 mk. d.; 220 mk. e. Potassium Permanganate, 350 mk. d.; 480 mk. e. Potassium Prussiate, yellow, 700/900 mk. d.; red, 1,000 mk. d. Salt Cake, 10.25 mk. d. Soda Ash, 44 mk. d. Sodium Benzoate, scarce, at 380/400 mk. d. Sodium Bicarbonate, scarce, at 38 mk. d.; 58 mk. e. Soda, Caustic, 125/128° Bé., 88 mk. d.; liquor, 38/40°, 29 mk. d. Sodium Hyposulphite, crystallised, 36 mk. d.; 45/47 mk. e.; pea-form, 40 mk. d.; 64 mk. e. Sodium Salicylate, 450 mk. d. Sodium Silicate, 38/40° Bé., 38 mk. e. Sodium Sulphide, crystallised, 30/32%, 30 mk. d. Zinc Chloride, 195 mk. e. Zinc White, red-seal, 230/280 mk. d.; green-seal, £34 per ton e.

PHOTOGRAPHIC CHEMICALS: Ammonium Persulphate, 300 mk. d. Lead Nitrate, 160 mk. d. Pyrocatechin, 1,000 mk. d. Potassium Bromide, 130 mk. d. Ammonium Chloride, 98/100%, 75 mk. d. Silver Nitrate, 24,000 mk. d. Potassium Iodide, 10,000 mk. d. Phosphoric Acid, chem. pure, 24 mk. d. Ammonium Sulpho Cyanate, 220 mk. d. Corrosive Sublimate, 1,800 mk. d. Pyrogallic acid cryst, 3,000 mk. d.

Alsatian Potash Producers' Negotiations

THE Commercial Secretary at Paris has forwarded to the Department of Overseas Trade an extract from the *Bulletin Quotidien de l'Agence Télégraphique Radio* which states that a French delegation, which is headed by Monsieur Louis Mercier, Vice-President of the Comité des Forges, is now engaged at the Hague in an endeavour to re-establish the group formed by the producers of potash in Alsace and in Germany, which before the war possessed the world monopoly of this product.

Manchester Chemical Market

Monthly Report by Sir S. W. Royse and Co., Ltd.

THERE has been an improvement in the home demand during August notwithstanding the holidays, but consumers are still interesting themselves only in near delivery. The export inquiry is also somewhat better, but business continues difficult to arrange. Prices on the whole have remained in buyers' favour, but are generally steady.

There has been a fair amount of business passing in sulphate of copper for export but little doing for home consumption; prices have remained steady and show little or no margin for manufacturers. Green copperas is unchanged. Supplies of acetate of lime are scarce and firmly held, whilst acetic acid is realising better figures. A good business has been done in acetate of soda, and stocks are only small. Acetates of lead and nitrate of lead have been in fair request with little alteration in values, although litharge and red lead have just been reduced 25s. per ton.

Carbonate of potash has been in only poor demand, but price is unchanged. Caustic potash is rather easier. Montreal potashes are neglected, although stocks are light both here and in Canada. Yellow prussiates of potash and soda have been in better supply at lower prices, but stocks are not too plentiful. White powdered arsenic continues very scarce, and price has again been advanced. Tartaric acid and cream of tartar have been freely offered, and concessions in price made; the raw material market is however reported firm. Resale parcels of citric acid continue to be pressed for sale. Bichromates of potash and soda have been in better request at unchanged values. Little business is being done in chlorates of potash and soda, and prices are easier. Oxalic acid is dull. Borax and boracic acid are without alteration in price and the demand is slow. Phosphate of soda has been in only moderate request. The keen competition from the Continent continues in alum and sulphate of alumina and values are again lower. Muriate of ammonia and salammoniac are unchanged in price, and there has been a better inquiry for export. At the beginning of the month concessions were made in the figures for ammonia, alkali, bleaching powder and caustic soda.

Coal Tar Products

The tar product market is quiet, as usual at this time of the year. Benzols and toluols are in poor demand, the former being affected by the price of petrol. Solvent naphtha is in somewhat better demand for prompt delivery and prices have stiffened; forward business however is not interesting to buyers, who prefer to cover present needs only. Creosote continues firm, the American demand having a considerable effect upon the position; larger supplies are, however, anticipated in the near future, owing to the expected early settlement of the American strike, the increased production of tar and the cessation of the demand for dehydrated tar. Crude carbolic acid is still restricted in production, and a better inquiry for crystals has slightly hardened prices. Naphthalenes are lifeless. Pitch remains firm for this year's delivery, but consumers are not inclined to pay the figures asked for by the makers. The forward position is still obscure, but makers are not disposed to sell over the coming season at current values. In sulphate of ammonia the export trade has been well maintained, and home consumers have recently taken larger quantities.

The inquiry for farina has been slow, buyers covering only for their early needs in view of the low prices ruling for the new season's product for later shipment. Dextrine is lower and has been steadily called for. A good trade has been passing in barytes. American turpentine has fluctuated during August, prices having been as high as 103s. per cwt and stocks are reported light. There is an improved demand for imported olive oil soap, and fair shipments are on the way. Paraffin wax and scale are called for only sparingly and prices are inclined to ease. Castor oil is unchanged.

Fire Risk in the Transportation of Chemicals

AT the Pittsburgh, Pa., experiment station of the U.S.A. Bureau of Mines, tests are being made to determine the fire risk of sodium nitrate, potassium nitrate, and ammonium nitrate in transportation and handling.

The Nitrate Market

Demand from U.S.A. and Japan

In their monthly report on nitrate of soda Henry Bath and Son state that deliveries from European ports during August amounted to 30,000 tons, against 22,000 a year ago. The demand for nitrate on the spot has been very small, and the value in Continental markets has sagged from £12 to about £11 15s. per ton. Business in forward delivery has also come almost to a standstill owing to the recent large fluctuation in exchange; and also occasional transactions in spring delivery are taking place on a sterling basis at about £12 10s. to £12 17s. 6d. per ton. On the other hand the work of laying in wholesale supplies has continued actively, and parcels by liners have changed hands at £11 10s. August shipment, £11 12s. 6d. September, £11 16s. 3d. October, and £12 5s. December; while an early August sailing vessel cargo realised £11 15s. c.i.f. At the close the cargo market is rather quieter with August shipment probably obtainable at £11 12s. 6d., and September at about £11 14s. c.i.f. Havre-Hamburg range.

Very considerable quantities of nitrate f.a.s. Chile have been disposed of during the past month by the Nitrate Producers' Association. The total sales by that body for delivery during the current nitrate year amount to about 790,000 tons, of which about 575,000 tons were sold for delivery during the three months July to September. It is estimated that of the total sales approximately only one half, say 400,000 tons, are destined for Europe, and the purchase so early of a like quantity for shipment to the United States and other countries augurs well for a good extra-European consumption. Both in America and Japan the demand for nitrate has been greatly stimulated by its cheapness and by the scarcity of sulphate of ammonia, and previous years' consumption of nitrate in those countries may prove to be no criterion of current requirements. The demand for June, 1923, shipment was in excess of the quantities sold, and is evidence of a growing idea that prices for the year commencing July, 1923, will be fixed above those on the present scale.

In Germany the headlong crash in the value of the mark has resulted in an enormous increase in the cost of producing synthetic nitrogen, and the output is expected to suffer; but in such a condition of affairs the importation of nitrate into Germany, though more than ever necessary, will on the same grounds be rendered as much more difficult to finance, and the outlook in this connection is still most uncertain. The German Government has granted a free licence for the importation of up to 200,000 tons of nitrate; but the means of financing this quantity have presumably still to be devised.

Bulk Storage of Petroleum Products

A memorandum and draft regulations in connection with the bulk storage of petroleum products has just been issued by H.M. Petroleum Department, and is obtainable from H.M. Stationery Office [3d. net]. The regulations have been drawn up primarily for guidance in connection with the erection of petroleum installations abroad, and its contents do not in any way affect the application to installations in the United Kingdom of the provisions of the Petroleum Acts, 1871–1879, for which the Home Office is the central authority. Among the subjects dealt with are the classification of petroleum products, fire precautions, ventilating openings, precautions against lightning, capacity of enclosures surrounding tanks, valves in pipe mains, clearing tanks of gas, construction of tanks, use of metal containers, etc.

Lord Leverhulme's Canadian Tour

The following amusing reminiscence of Lord Leverhulme's recent tour was given in the *Liverpool Daily Post* last week:—"Lord Leverhulme is accustomed to a certain amount of familiarity—for instance, the school children of Port Sunlight affectionately call him 'uncle.' During his recent tour on the Western Continent he was given a greeting by the Toronto co-partners of Lever Brothers, Ltd., which must have taken him aback. He was attending a dinner of the employees of the company, and his entry into the hall was a signal for the diners to give a united shout of 'Hello, Bill!' His lordship accepted the unique welcome in good part."

Contracts Open

Tenders are invited for the following articles. The latest dates for receiving tenders are, when available, given in parentheses:

Australia (October 11).—Sodium acetate (5 tons). Particulars from Department of Overseas Trade (Room 53), 35, Old Queen Street, London, S.W.1. (Reference No.: D.O.T. 9320/E.D./C.P.)

London (September 11).—Lead, copper, grease, tallow, lubricating oils, linseed, etc. Particulars from W. Moon, 173, Rosebery Avenue, London, E.C.1.

Egypt (October 2).—Tieröl (about 3,000 litres). Particulars from Department of Overseas Trade, 35, Old Queen Street, London, S.W.1. (Reference No.: D.O.T., 8759/F.E.)

Gosport (September 19).—Disinfectants, cement, lime. Particulars from Surveyor, Town Hall, Gosport.

Ilford (September 18).—Lime. Particulars from H. Shaw, Town Hall, Ilford, Essex.

Dublin (September 20).—Sulphuric acid, colours, crucibles, plumbago, soaps. Particulars from Stores Superintendent, General Stores Department, Gt. Southern and Western Railway (Ireland), Inchicore, Dublin.

Westminster (September 25).—Pitch, creosote oil, soaps. Particulars from J. Hunt, City Hall, Charing Cross Road, London, W.C.2.

Government Contracts

The following were among the Government contracts let during July:

Admiralty (Contract and Purchase Department).—*Evaporating and Distilling Plant:* Caird and Raynor, London. *Portland Cement:* Cement Marketing Co., Ltd., London.

War Office.—*Sulphuric Acid:* Spencer, Chapman and Messel, Ltd., Silvertown.

Air Ministry.—*Salt for Water Softening:* Salt Union, Ltd., Liverpool. *Soap, Coarse:* Christopher Thomas and Brothers, Bristol.

Crown Agents for the Colonies.—*Cod Liver Oil:* Burroughs, Wellcome and Co., London. *Cement:* Tunnel Portland Cement Co., Ltd., London; Cement Marketing Co., Ltd.; Ship Canal Portland Cement Works, Ltd., Liverpool. *Drugs, etc.*: Howards and Sons, Ltd., Ilford.

Lead and Fluorspar Mine Dispute

At Manchester on September 1 Barmaster Eagle, of Manchester, and two grand jurymen, were called upon to decide the ownership of a Derbyshire lead and fluorspar mine—the High Low Mine, Masson Hill. It appeared that possession of the mine was granted some months ago to a Mr. Brown, of Matlock, Derbyshire. On the ground that the mine was not being reasonably worked within the statutory period, twenty-one days, Mr. Clarence Pearson, of Langley Mill, entered a claim for the same mine. Since the original claim was granted a valuable deposit of fluorspar has been discovered on the property. After hearing the evidence Barmaster Eagle decided to refuse the claim of Mr. Pearson. It was satisfactorily proved that the present owner of the title was working the mine reasonably for lead according to local mining customs.

West African Palm Oil Trade

Presiding on September 1 at the annual meeting of the African and Eastern Trade Corporation, Ltd., held at the Exchange Station Hotel, Liverpool, Mr. J. H. Batty said that West Africa was still suffering from over-taxation. The abomination of the export duties was having a very detrimental effect on trade in the British West African Colonies, and the directors were determined not to rest until they got these duties removed altogether. The whole trade had been newly heartened by the recent reduction of 50 per cent. of the export duty on cocoa in the Gold Coast, and he hoped it would not be long before they had some similar encouragement from Nigeria relative to palm oil and kernels. Speaking on the proposed arrangement with Lever Brothers, Ltd., Mr. Batty said it was impossible for him to disclose the reasons why that agreement was not completed unless he had the permission of Lord Leverhulme.

Company News

DUBLIN AND WICKLOW MANURE CO., LTD.—The directors announce a dividend of 5 per cent. for the year to June 30 last.

MORGAN CRUCIBLE CO., LTD.—The transfer-books will be closed from September 16 to 30 inclusive for the preparation of dividend warrants.

BRITISH ALIZARINE CO., LTD.—The accounts for 1921 show a net profit of £16,390, making with £15,115 brought in a credit balance of £31,505 to be carried forward.

BRITISH COTTON-SEED PRODUCTS, LTD.—Application has been made to the Stock Exchange Committee to allow 230,000 shares of £1 each, fully paid, Nos. 1 to 230,000 to be quoted in the Official List.

UNITED TURKEY RED CO., LTD.—Regret is expressed by the directors that they do not feel justified in declaring an interim dividend on the ordinary shares. No dividend was paid on the ordinary shares for 1921. For 1920, 10 per cent., free of tax, was paid.

DOMINION TAR AND CHEMICAL CO., LTD.—A final dividend of 2½ per cent. and a bonus of 2½ per cent., both free of income-tax, have been declared in respect of the half-year ended June 30 last, subject to confirmation at the annual meeting to be held on September 20. The transfer books will be closed from September 13 to 20 inclusive.

F. STEINER AND CO.—The directors announce that although substantial progress has been made with the Inland Revenue authorities, a final settlement has not yet been reached. They recommend that the dividend on the ordinary shares for the year ended July 31 last be at the rate of 5 per cent. The meeting called for September 13 will be adjourned to a later date.

KAYE'S RUBBER LATEX PROCESS, LTD.—Applications have been invited for an issue of 10,000 ordinary shares of £1 each, and 22,000 deferred shares of 1s. each at par. The company, which has an authorised capital of £12,000 (10,000 ordinary shares and 40,000 deferred shares) has been formed for the purpose of taking over the patents and patent rights of an invention for the improvement in the process of paper making. The inventor's description of the process appears on page 343. It is proposed to sell patent rights outright or to form subsidiary companies in various countries. It was announced on Thursday that the capital had been largely over subscribed.

ISIS CHEMICALS AND DYES, LTD.—In accordance with the regulations of the Committee of the Stock Exchange particulars of this company are published for information only. According to the statement, the company has an authorised capital of £30,000 in 300,000 ordinary shares of 2s. each of which the whole is issued and fully paid up. The company was formed to acquire from Mr. C. H. Field, F.I.C., who is now consulting chemist to the company, certain processes for the manufacture and production of dye bases as applicable to the production of aniline dyes and other chemicals. The Ophir Syndicate, Ltd., undertook to transfer to the company certain rights and formulæ, including an important base for the production of aniline dyes. The registered offices of the company are at St. George's Chambers, Athol Street, Douglas, Isle of Man, but the London transfer office is at 8, Union Court, Old Broad Street, London.

DISTILLERS' CO., LTD.—It is officially stated that the deal whereby the company will acquire extensive Irish distillery and yeast producing interests at a total cost of £3,000,000 has now been finally completed, and the purchase price paid. The company offered to purchase the whole of the ordinary shares of the Distillers' Finance Corporation, Ltd., Belfast, provided the holders of 76 per cent. of the shares accepted, and in the result the holders of over 99 per cent. of the shares have accepted. Of the purchase price of nearly £3,000,000 over £1,000,000 has been satisfied by the issue of ordinary shares of the Distllers' Co. at a price of £20. The balance of £2,000,000 has been paid in cash, but the amount to be financed temporarily is only about £700,000. The interests taken over include the United Distilleries, Ltd., an important yeast, industrial spirit, and Irish whisky producer, the Ferintosh Distillery Co., of Dingwall, and about half a dozen whisky distributing houses.

B. LAPORTE, LTD.—The report for the year ended June 30 last states that the net profit, after charging depreciation, directors' fees, etc., was £17,586 7s. 2d., to which must be added £1,944 14s. 8d., brought forward, making £19,531 1s. 10d. Payment of dividends on the preference shares (already paid) for the year ending June 30, 1922, absorbs £5,610, and the balance will be allocated as follows:—£2,000 to Income Tax Suspense Account; £1,000 to reserve for bad debts; £6,000 for dividend on the said shares at the rate of 10 per cent. per annum, less tax, leaving £4,921 1s. 10d. to be carried forward, subject to directors' commission. A sum of £4,000 has been received during the year on account of refund of excess profits duty, and a further sum (not finally agreed) will be received. The amount actually recovered only, has been brought into the accounts and has been placed to the credit of Income Tax Suspense Account, to meet future taxation. The sum of £16,579 2s. 4d. has been expended during the past year on additional plant and buildings, including the completion of purchase of land (and buildings thereon) referred to in the last report. Plans are now being got out for development of this latter purchase. Although the outlook during the first few months of the year under review was somewhat depressing, the position gradually improved and, thanks to the Company's organisation, they were enabled to take full advantage of the improvement in trade; taking the year as a whole, the results are regarded as satisfactory. As trade in general appears to show an upward tendency, the directors take a hopeful view of the future. The fifteenth annual general meeting was held yesterday (Friday) at Kingsway, Dunstable Road, Luton.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LOCALITY OF FIRM OR AGENT.	MATERIAL.	REF. NO.
Poland (Upper Silesia)	Edible oils, fats and American pure lard	255
Gothenburg ..	Dyes, tanning extracts, heavy chemicals and drugs	256

Tariff Changes

NIGERIA.—As from July 6 last the Palm Kernels (Export Duty) No. 2. Ordinance, 1919, imposing a differential export duty on palm kernels exported from the Colony, is abolished.

AUSTRIA.—A notice in the *Board of Trade Journal* of August 31 (p. 245) announces amendments of the Customs duties on certain articles. Coal tar oils, paraffin wax, ceresine, petroleum jelly, yeast, and perfumery are among the commodities affected.

DENMARK.—Liquid acetic acid for technical use may be imported duty-free when denatured according to rules fixed by the Customs authorities.

FRENCH COLONIES.—The exportation from French Colonies and Protectorates other than Tunis and Morocco of uranium ore to destinations other than France and French Colonies and Protectorates is prohibited as from August 26.

GERMANY.—The surtax levied when the gold duties of the German Customs Tariff are paid in paper currency is increased to 21,900 per cent for the period August 30 to September 5.

UNITED STATES OF AMERICA.—The following amendments to the United States Tariff Revision Bill were made by the Senate in the week ending August 12:—Arsenious acid or white arsenic is placed on the Free List under para. 1513a. Para. 1635 of the Free List now reads:—Potassium chloride or muriate of potash, potassium sulphate, kainit wood ashes, and beetroot ashes, and all crude potash salts not specially provided for.

Recent Will

Mr. Arthur Collings Wells, Brands House, High Wycombe, of A. C. Wells & Co., Midland Road, St. Pancras, London..... £82,327

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

COOPER, S., 8, Axe Street, Barking, drug store keeper. £10 7s. 5d. July 24.

DACEY, W. D., 65, Clarendon Road, Lewisham, chemist. £20 12s. 11d. July 24.

MARSHALL, Sidney, 78, King Street, Kingsland, chemist. £32 6s. 6d. July 19.

SCOTT, J. Wilson, Tyseley, Birmingham, chemist. £45 19s. 3d. July 14.

WESTERN TABLET CO., LTD., 106, Church Street, Kensington, chemists. £23 3s. July 4.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

ALMOND (WILLIAM), LTD., Blackburn, neatsfoot oil manufacturers.—Registered August 25, £600 mortgage, to J. Yates, Belthorn, near Blackburn, grocer; charged on 122, Lytham Road, South Shore, Blackpool. *Nil. June 30, 1921.

GRAFTON CHEMICAL CO., LTD., Chorlton-on-Medlock.—Registered August 25, £400 debenture, to P. W. Weston, 59, Grafton Street, Chorlton-on-Medlock; general charge.

Satisfaction

STELLA GILL COKE AND BY-PRODUCTS CO., LTD., London, E.C.—Satisfaction registered August 25, £20,000, registered May 26, 1922.

Receivership

W. H. COLTON AND CO., LTD.—A. P. Highett, of 9, Laurence Pountney Hill, London, E.C., was appointed receiver on August 14, 1922, under powers contained in first mortgage debenture dated December 15, 1921.

London Gazette

Bankruptcy Information

LEVIN, Bertram, 16, Deansgate, Manchester, chemical manufacturer. Receiving order, August 30. Creditor's petition.

SPENCER, Harry H., 110, Strathbrook Road, Streatham, and lately carrying on business at 384a, Rotherhithe New Road, both London, chemist. Receiving order, August 31. Creditor's petition. First meeting, September 13, 11 a.m., and public examination November 28, 11.30 a.m., Bankruptcy Buildings, Carey Street, London, W.C.2.

STEVEN, George, 118, Chorlton Road, Old Trafford, under the style of G. STEVEN AND CO., manufacturing chemist. Day fixed for hearing, September 12, 10.45 a.m. Place, Court House, Encombe Place, Salford.

Notice of Intended Dividend

STOPFORTH, Richard, trading as ROWAND AND CO., 10, Eaton Street, Liverpool, wholesale druggist. Last day for receiving proofs, September 15. Trustee, P. S. Booth, 2, Bixteth Street, Liverpool.

New Companies Registered

AUSTIN AND SON (NECHELLS), LTD., Excelsior Works, Nechells, Birmingham. Manufacturing chemists, etc. Nominal capital, £2,500 in £1 shares.

BYRINE, LTD., 62, Old Steine, Brighton. To acquire a secret process for the manufacture of disinfectants, toilet products, etc. Nominal capital, £600 in £1 shares.

EMBLEY ESTATES CO. (private unlimited company). Manufacturers of artificial manures, etc. Nominal capital, £20,000 in £1 shares. A director: J. J. Crosfield, Embley Park, Romsey, Hants.

LEWMAN CO., LTD., 618, Old Ford Road, Bow, London. Manufacturers, importers and exporters of and dealers in cleaning preparations, disinfectants, oils, greases, etc. Nominal capital £100 in £1 shares.

LIFE SAVERS SALES, LTD. Dealers in drugs, chemicals, patent medicines, etc. Nominal capital, £5,000 in £1 shares. A director: Sir A. P. du Cros. A subscriber: F. E. Stafford, 40, Chevening Road, Brondesbury Park, London, N.W.6.

MURRAY AND RAMSDEN, LTD., Vulcanite Engineering Works, Carrington Field, Stockport. Chemical manufacturers, manufacturers of ebonite, vulcanite, synthetic rubber, etc. Nominal capital, £20,000 in £1 shares.

OIL TRANSFORMERS, LTD., 27, Leadenhall Street, London, E.C. Dealers in petroleum and its products, and to form companies for the acquisition and working of processes for transforming heavier oils into lighter fractions. Nominal capital, £1,000 in £1 shares.

RICHARDSON AND McWILLIAM, LTD. Manufacturers of chemicals and manures, distillers, dye and gas makers, etc. Nominal capital, £10,000 in £1 shares. A director: E. T. Richardson, Burnbank, Menlove Avenue, Mossley Hill, Liverpool.

SCIENTIFIC PREPARATIONS, LTD., 46, Peartree Street, Goswell Road, London. Manufacturing and wholesale chemists, etc. Nominal capital, £100 in 1s. shares.

TARBITUMAC, LTD., 65, Victoria Street, London, S.W.1. Dealers in lime, cement, etc. Nominal capital, £30,000 in £1 shares.

TRIANGLE MANUFACTURING AND EXPORT CO., LTD., 23, Sun Street, Finsbury, London, E.C. Manufacturers of and dealers in perfumery, chemicals, etc. Nominal capital, £1,000 in £1 shares.

UNICA CO., LTD., manufacturers of chemicals, dyes, colours, analysts and experimental workers, etc. Nominal capital, £3,000 in 2,000 ordinary shares of £1 each and 5,000 non-cumulative preference shares of 4s. each. A subscriber: P. G. Hutton, 52, New Broad Street, London.

VINPROLEX, LTD., 184, Stockpool Road, Ardwick, Manchester. Manufacturers of chemicals, dyes, bleaching preparations, oil, etc. Nominal capital, £2,000 in £1 shares.

WALKER DYEING CO. (1922), LTD., Calderside Works, Hebden Bridge, Yorkshire. Dyers, finishers, bleachers, etc. Nominal capital, £8,000 in £1 shares.

"Metrogas"

THE September issue of the *Co-partnership Journal* of the South Metropolitan Gas Company is distinguished by its usual vivacity. In addition to the editorial notes, which touch lightly on many current topics and include an amusing tilt at *Punch* on the subject of "therminological inexactitudes" and a record of personal events and athletic and musical activities, there are some interesting general contributions. These include an account of the War Fund, with portraits of the committee; an illustrated sketch of the "Captains of the Colliers," good seamen types, whose work is cordially acknowledged; an article on "Time and its Measurement," by C. W. T. Layton, ending in a good word for summer time; and the concluding article of Lieut.-Colonel R. J. W. Oswald's series on "Food and Industry," which incidentally destroys our faith in cocoa by informing us that it requires about 75 cups to supply the necessary energy for a day. This, however, is more than made up for by arguments that restore our faith in the therm and by an excellent paragraph of advice on how to avoid waste and its consequent unnecessary expenditure in the use of gas.